

## **Appendix B. Planning and Scheduling (PAS) Screen Descriptions**

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The objective of Planning and Scheduling system (PAS) is to allow the instrumenters at the ISTs and the FOT in the EOC to define and schedule activities needed to support the instrument science operations needs, to help the FOT produce a conflict-free schedule of activities that can then be used to generate appropriate command sequences for the instruments and the spacecraft. During all phases of scheduling, the PAS provides the authorized users with a set of tools for global schedule visualization and development of schedule for their own instrument. The Timeline tool in the PAS provides the Instrument Operations Team (IOT) at an IST with global visibility into planned operations of all EOS instruments and the spacecraft. The IOT may define activities for their instrument, and submit scheduling requests using these activities. The PAS ensures plan integrity using a Plan tool which manages the EOC Master plan and all user defined plans. The plan tool allows an authorized user to establish access for an instrument for a specific time period on a plan, and thus prohibits other users from modifying the same portion of the plan when one IOT is using it. The PAS integrates requests from an IOT with those of the other instruments and spacecraft. The PAS determines the TDRSS contacts needed to support the data volume needs of each instrument, as specified in the activity definitions, and identifies any possible constraints. The FOT at the EOC tries to resolve constraints with the instrumenters; in case of conflict, the Mission Operations Manager makes the final decision on resolving the conflict.

The PAS tools include several Motif widgets consistently across several displays and tools. The use of these general widgets is described in section B.1. Section B.2 describes the tools provided as part of PAS subsystem. These tools include Activity Definer, BAP definer, Scheduler, Plan tool, Constraint Definer, Timeline, Communication Contact Scheduler, ATC Load generator. The descriptions include the usage, the access method, user interface screen samples, the input expected from the user, and the output for each tool. The user interface for all these tools is designed based on the X-windows standards, and provides a consistent look and feel for all displays.

### **B.1 General Motif Widgets Used in PAS**

PAS system uses several standard Motif widgets and some combinations of them to provide consistent user interaction. These include labeled lists, time specification widgets. On the labeled lists, the widget consists of a label and scrolled list widget; the user can scroll the list and select one of the items on the list by clicking on it. On a time specification widget, the user can enter time values in a text field and specify the units of time on a pop-menu widget. The options provided on this menu are mm:ss, hh:mm:ss, ddd:hh:mm:ss, etc.

## **B.2 PAS Tools**

### **B.2.1 Activity Definer**

#### **B.2.1.1 Activity Definer Usage**

The activity definer tool is used by the IOT or the EOC FOT to define an activity which is a logical command sequence to perform an action on an instrument or the s/c, referred to as a resource. An activity may or may not change the mode of the resource. An activity may or may not have power consumption or data rate associated with it. The tool can also be used for editing a previously defined activity or simply for viewing it.

The user uses the Activity definer to define the following attributes of an activity: the ATC or ground script (ECL) commands with specific relative times from beginning of the activity, the power, data rate, any mode transitions resulting from an activity, any constraints associated with an activity.

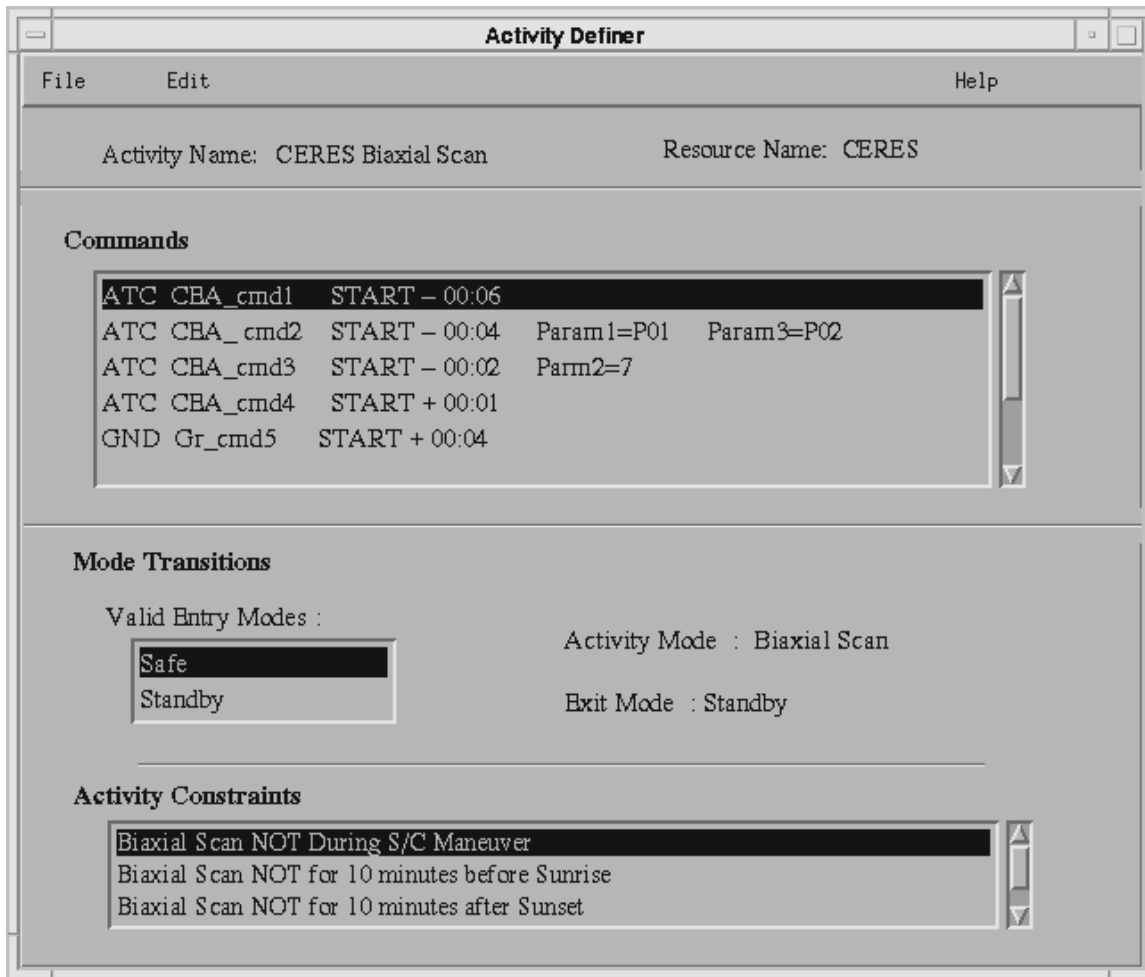
#### **B.2.1.2 Activity Definer Access**

The activity definer is brought up when the user selects this tool from the options provided in the "PAS room" provided by FOS User Interface subsystem (FUI). The sample screens for the Activity Definer tool are shown in Figures B.2.1.3.1-1 through B.2.1.3.1-7. The following subsections provide the input and output for each of these display screens.

#### **B.2.1.3 Activity Definer Displays**

##### **B.2.1.3.1 Activity Definer Top Level Display**

The top level display always shows summary information about an activity as it is developed by the user on other displays.



**Figure B.2.1.3.1-1. Activity Definer Top Level Display**

#### **B.2.1.3.1.1 Activity Definer Top Level Display Input**

The "File" pull-down menu on the top level screen provides the OPEN, NEW, SAVE, DELETE and QUIT functions, as applicable to activities. The "Edit" Pull-down menu includes the options for bringing up displays that support the command editing, constraint definition, mode transition specification, and parameter specification for the activity.

#### **B.2.1.3.1.2 Activity Definer Top Level Display Output**

Whenever the user selects an option from one of the two pull-down menus the appropriate display screen is brought up for the user to specify details on the activity.

### B.2.1.3.2 Activity Definer Command Editor Display

Activity Name: Solar calibration Resource : CERES

☒ ATC Command ☐ Ground Command ☐ User Comment

Available Commands Activity Command List

Available Commands	Activity Command List
CEA_cmd1	ATC CEA_cmd1 START - 00:06
CEA_cmd2	ATC CEA_cmd2 START - 00:04
CEA_cmd3	ATC CEA_cmd3 START - 00:02
CEA_cmd4	ATC CEA_cmd4 START + 00:01
CEA_cmd5	GND Gr_cmd5 START + 00:04
CEA_cmd6	GND Gr_cmd6 STOP - 00:05

☒ Relative Time ☐ AbsoluteTime ☐ Suspend

Relative Time For Command from ☒ Start ☐ End of Activity

☒ + ☐ -

OK ADD DELETE CANCEL HELP

**Figure B.2.1.3.2-1. Activity Definer Command Editor Display**

#### B.2.1.3.2.1 Activity Definer Command Editor Display Input

Available Commands - This scrolled list widget contains the list of available commands for the specified resource from the Project Data base (PDB). The user can select any one command from this list at a time by clicking on it.

Activity Command List - This scrolled list widget contains user selected commands; user can select a command from this list and then specify the time offset for the command using the Time specification widget below.

The user can select the command type and whether the offset is from the start of the activity or the end of the activity using the radio buttons. The use of Time specification widget is described in section B.1.2 above.

The ADD button allows the user to add a command from the list of available commands to the Activity command list. The DELETE button allows the user to delete a previously specified command from the Activity command list.

The user clicks the OK button to complete the specification for all commands.

#### **B.2.1.3.2.2 Activity Definer Command Editor Display Output**

The Activity command list on this display shows the user selected list of commands for the activity, the command type as well as the relative time offsets. When the user clicks the OK button, the list is transferred to the Activity Definer top level display.

#### **B.2.1.3.3 Activity Definer Enumerated Parameters Display**

The screenshot shows a dialog box titled "Activity Enumerated Parameters". It contains the following fields and controls:

- Activity Name:** CERES Biaxial Scan
- Resource:** CERES
- Activity Command List:** A list box containing three entries:
  - ATC CEA\_cmd1 START - 00:06
  - ATC CEA\_cmd2 START -00:04 Parm1=P01
  - ATC CEA\_cmd3 START - 00:02 Parm2=7
- Parameters:** Two text input fields labeled "Parm1" and "Parm2".
- Parameter Values (Enumerated):** A list box showing "HIGH" with up and down arrow buttons.
- Buttons:** OK, APPLY, CANCEL, and HELP at the bottom.

**Figure B.2.1.3.3-1. Activity Definer Enumerated Parameters Display**

#### **B.2.1.3.3.1 Activity Definer Enumerated Parameters Display Input**

Activity Command List - This scrolled list widget contains the list of available commands defined for the activity. The user can select any one command from this list at a time by clicking on it. The parameters for the selected command are shown on the Parameters scrolled list widget.

Parameters - This scrolled list widget contains the list of parameters for the selected command. The user can select any one parameter from this list at a time by clicking on it. If the parameter is of the type "enumerated", the valid parameter values are displays as a scrolled list in the Parameter Values widget.

Parameter Values - This scrolled list widget contains the list of valid discrete values for the selected parameter. The user can select any one value from this list at a time by clicking on it.

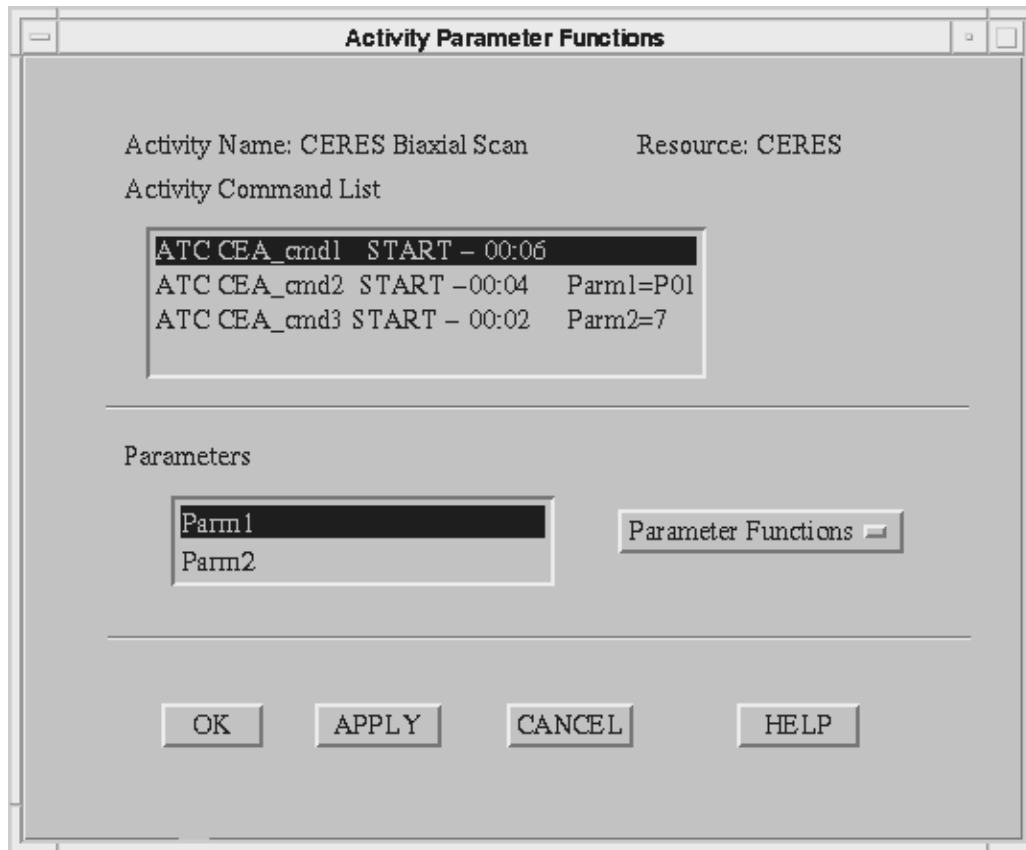
When the user clicks the APPLY button, the selected value is shown on the command line in the Activity Command List widget.

The user clicks the OK button to complete the parameter value specification for all commands.

#### **B.2.1.3.3.2 Activity Definer Enumerated Parameters Display Output**

The Activity Command List is updated as the user selects the parameter values for each command, as described above. The Parameters scrolled list always shows the valid parameters for the user-selected command. The default when this display comes up, is the parameters for the first command. When the user clicks the OK button, the list of parameters is transferred to the Activity Definer top level display.

#### B.2.1.3.4 Activity Definer Parameter Functions Display



**Figure B.2.1.3.4-1. Activity Definer Parameter Functions Display**

##### B.2.1.3.4.1 Activity Definer Parameter Functions Display Input

**Activity Command List** - This scrolled list widget contains the list of available commands defined for the activity. The user can select any one command from this list at a time by clicking on it. The parameters for the selected command are shown on the Parameters scrolled list widget.

**Parameters** - This scrolled list widget contains the list of parameters for the selected command. The user can select any one parameter from this list at a time by clicking on it. If the parameter has a function associated with it, the list of valid functions is provided as options on the Parameter Function button.

**Parameter Functions** - This pop-up menu widget provides the list of valid functions defined for the selected parameter. The user can select any one function from this list at a time using the pop-up menu.

When the user clicks the APPLY button, the selected function is shown on the command line in the Activity Command List widget.

The user clicks the OK button to complete the parameter value specification for all commands.

#### B.2.1.3.4.2 Activity Definer Parameter Functions Display Output

The Activity Command List is updated as the user selects a parameter function for each command, as described above. The Parameters scrolled list always shows the valid parameters for the user-selected command. The default when this display comes up, is the parameters for the first command. When the user clicks the OK button, the list of parameters is transferred to the Activity Definer top level display.

#### B.2.1.3.5 Activity Definer Parameter Ranges Display

The screenshot shows a dialog box titled "Activity Parameter Ranges". It contains the following fields and controls:

- Activity Name:** CERES Biaxial Scan
- Resource:** CERES
- Activity Command List:** A list box containing three entries:
  - ATC CEA\_cmd1 START - 00:06
  - ATC CEA\_cmd2 START -00:04 Parm1=P01
  - ATC CEA\_cmd3 START - 00:02 Parm2=7
- Parameters:** A list box containing two entries:
  - Parm1
  - Parm2
- Parameter Values (Numeric):** Three input fields labeled "Default Value", "High Limit", and "Low Limit", each containing a question mark (?) as a placeholder.
- Buttons:** Four buttons at the bottom: "OK", "HELP", "CANCEL", and "HELP".

**Figure B.2.1.3.5-1. Activity Definer Parameter Range Display**

#### B.2.1.3.5.1 Activity Definer Parameter Ranges Display Input



Activity Command List - This scrolled list widget contains the list of available commands defined for the activity. The user can select any one command from this list at a time by clicking on it. The parameters for the selected command are shown on the Parameters scrolled list widget.

Parameters - This scrolled list widget contains the list of parameters for the selected command. The user can select any one parameter from this list at a time by clicking on it. If the parameter has a range associated with it, the range defined in the PDB is shown in the text widgets under Numeric parameter values.

Parameter Values - The text field widgets allow the user to specify new default value and another range for the parameter, as appropriate for the current activity. The user may change the values of the high and low limits or the default value by typing the values in the appropriate fields. The new range must be the same as or must be subset of the range defined for the command in the PDB.

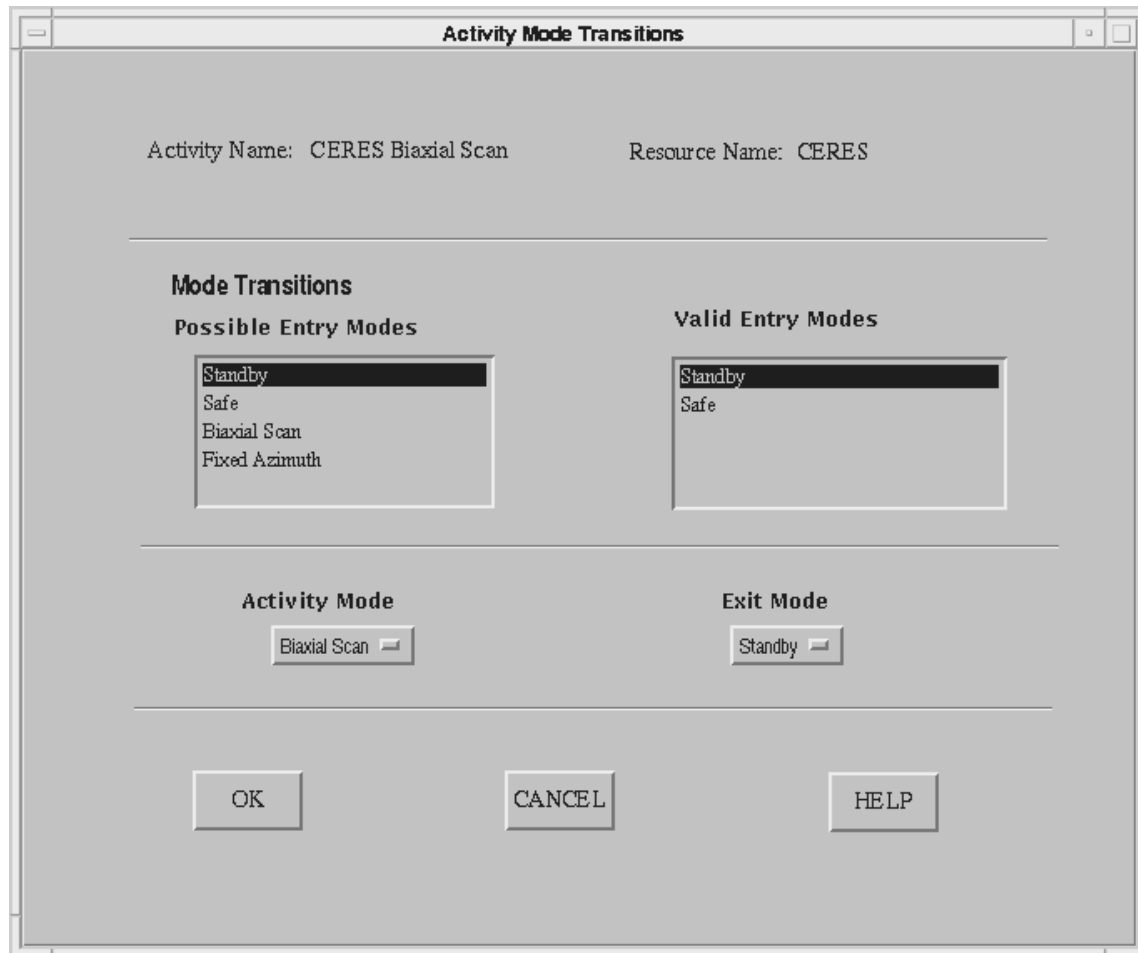
When the user clicks the APPLY button, the selected function is shown on the command line in the Activity Command List widget.

The user clicks the OK button to complete the parameter value specification for all commands.

#### **B.2.1.3.5.2 Activity Definer Parameter Ranges Display Output**

The Activity Command List is updated as the user selects a parameter function for each command, as described above. The Parameters scrolled list always shows the valid parameters for the user-selected command. The default when this display comes up, is the parameters for the first command. When the user clicks the OK button, the list of parameters is transferred to the Activity Definer top level display.

### B.2.1.3.6 Activity Definer Mode Transition Display



The dialog box titled "Activity Mode Transitions" contains the following elements:

- Activity Name: CERES Biaxial Scan
- Resource Name: CERES
- Mode Transitions**
  - Possible Entry Modes**: A list box containing "Standby", "Safe", "Biaxial Scan", and "Fixed Azimuth". "Standby" is selected.
  - Valid Entry Modes**: A list box containing "Standby" and "Safe". "Standby" is selected.
- Activity Mode**: A pop-up menu showing "Biaxial Scan".
- Exit Mode**: A pop-up menu showing "Standby".
- Buttons: OK, CANCEL, and HELP.

**Figure B.2.1.3.6-1. Activity Definer Mode Transitions Display**

#### B.2.1.3.6.1 Activity Definer Mode Transition Display Input

**Possible Entry Modes** - This scrolled list widget contains the list of valid entry modes for the instrument/subsystem. The user can select any one mode from this list at a time by clicking on it. The user can double-click on a mode in this list to add it to the list of Valid entry modes.

**Valid Entry Modes** - This scrolled list widget contains the list of user-selected entry modes for the instrument/subsystem. The user can double-click on a mode in this list to remove it from the list of Valid entry modes.

**Activity Mode** - This pop-up menu widget provides the list of valid mode for the instrument/subsystem. The user can select any one mode from this list at a time using the pop-up menu. This mode will be used as the activity mode in the activity definition.

Exit Mode - This pop-up menu widget provides the list of valid mode for the instrument/subsystem. The user can select any one mode from this list at a time using the pop-up menu. This mode will be used as the exit mode in the activity definition.

#### **B.2.1.3.6.2 Activity Definer Mode Transition Display Output**

The user-selected entry modes are shown on the Valid Entry Modes scrolled list. The user-selected Activity mode and Entry mode are shown on their respective pop-up menu widgets. When the user clicks the OK button, the user-specified modes are transferred to the Activity Definer top level display.

#### **B.2.1.3.7 Activity Definer Constraint Definition Display**

The screenshot shows a window titled "Constraints Definition Panel". Inside, there are two "START TIME OF" buttons. The first is followed by "CERES Biaxial Scan". Below these are four diamond-shaped operators: "<", ">", "<>", and "!<>". The second "START TIME OF" button is followed by a "Resource:" label, then a "CERES" button, and then a "CERES SOLAR CALIBRATION" button. Below this is a "By" label, followed by a "+" and "-" operator, a text box containing "03:10", and a "mm:ss" button. A horizontal line separates this from a "Constraints :" label. Below this is a large text box containing the text: "Start Time of CERES Biaxial Scan Less Than Start Time of Solar Calibration by +03:10 mm:ss". At the bottom are five buttons: "OK", "ADD", "REMOVE", "CANCEL", and "HELP". A status bar at the very bottom says "Less Than".

***Figure B.2.1.3.7-1. Activity Definer Constraint Definition Display***

#### **B.2.1.3.7.2 Activity Definer Constraint Definition Display Input**

The user can specify the constraints between two activities or an activity and an event as a temporal relation between their start and/or stop times. The pop-up buttons allow the user to select the from options Start time, Stop Time, Entire duration. The user can select the activity name (for which the constraints are being defined) from the list of activities previously defined for the instrument, using the activities pop-up menu at the top. The user can specify the name of the second activity by selecting the resource and the activities defined for it. If the constraint is to be defined with respect to an event, the user can select S/C as the resource; in this case, the events will be shown as options on the pop-up menu instead of activities.

The radio buttons for <, >, <> allow the user to specify the BEFORE, AFTER, and DURING constraints. The !<> radio button allows the specification of NOT During constraint.

#### **B.2.1.3.7.2 Activity Definer Constraint Definition Display Output**

The Constraints scrolled list shows all the constraints defined for an activity. When the user clicks the OK button, the list of constraints is transferred to the Activity Definer top level display.

### **B.2.2 BAP Definer**

#### **B.2.2.1 BAP Definer Usage**

The BAP definer tool is used by the IOT or the EOC FOT to define a Baseline Activity Profile (BAP) which consists of a number of activities to be scheduled for the instrument's normal or routine operations.

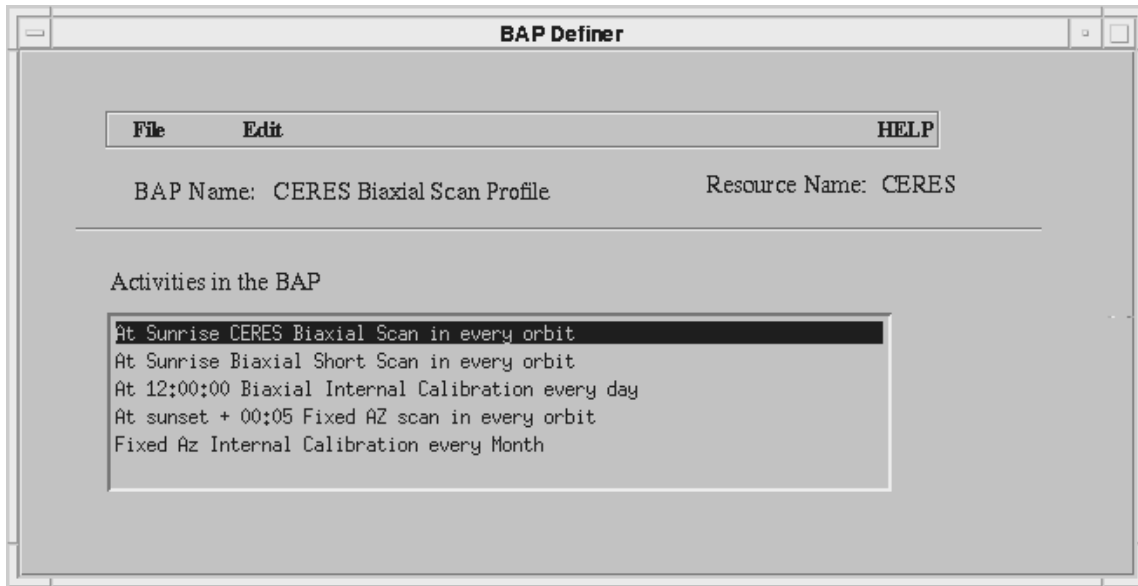
#### **B.2.2.2 BAP Definer Access**

The BAP Definer tool is brought up when the user selects this tool from the options provided in the "PAS room" provided by FUI. The sample screens for the BAP Definer tool are shown in the Figures B.2.2.3.1-1 through B.2.2.3.7-1. The following subsections provide the input and output for each of these display screens.

#### **B.2.2.3 BAP Definer Displays**

##### **B.2.2.3.1 BAP Definer Top Level Display**

The top level screen display shows summary definition of a BAP as it is developed by the user on other displays. The "File" pull down menu on the top level screen provides the OPEN, NEW, SAVE, SAVE AS, DELETE and QUIT functions, as applicable to BAPs. The "Edit" pull down menu allows the user to bring up screen displays where he can specify Activities, Parameters, and Activity scheduling information.



**Figure B.2.2.3.1-1. BAP Definer Top Level Display**

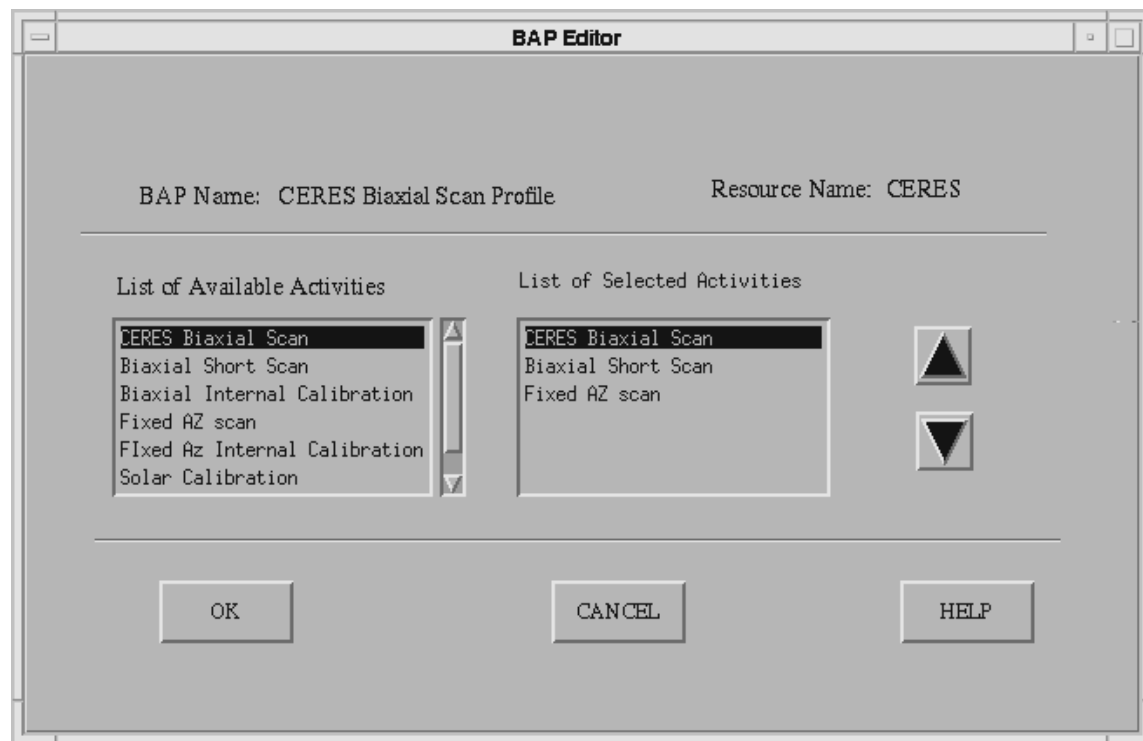
#### **B.2.2.3.1.1 BAP Definer Top Level Display Input**

The "File" pull-down menu on the top level screen provides the OPEN, NEW, SAVE, SAVE AS, DELETE and QUIT functions, as applicable to baseline activity profiles. The "Edit" Pull-down menu includes the options for bringing up displays that support the activity lists, scheduling information, and parameter specifications for the activities.

#### **B.2.2.3.1.2 BAP Definer Top Level Display Output**

Whenever the user selects an option from one of the two pull-down menus the appropriate display screen is brought up for the user to specify details on the baseline activity profile.

### B.2.2.3.2 BAP Definer Activity Editor Display



**Figure B.2.2.3.2-1. BAP Definer Activity Editor Display**

#### B.2.2.3.2.1 BAP Definer Activity Editor Display Input

This display is brought up when the activity list menu option under edit is pressed. When the user selects on an activity on the left side of the display, that activity gets placed into the bap and it is shown on the right side of the display. The user can place select an activity on the right side of the display and order the list by using the up and down arrows. The activities will move appropriately. When the ok button is pressed the bap is created with the activities that are on the right hand side and the window closes. When the Cancel button is pressed, the window closes and the changes are lost. When the help button is pressed, user interface help window will display the help information for this window.

#### B.2.2.3.2.2 BAP Definer Activity Editor Display Output

When the user has pressed the ok button the activities will be placed within the bap and the window will close. If the Cancel button is pressed, the window closes and the changes are lost.

When the help button is pressed, user interface help window will display the help information for this window.

### B.2.2.3.3 BAP Definer Enumerated Parameters Display

The screenshot shows a dialog box titled "BAP Enumerated Parameters". It contains the following sections:

- BAP Name:** CERES Biaxial Scan Profile      **Resource:** CERES
- Activities in the BAP:** A list box containing "CERES Biaxial Scan", "Biaxial Short Scan", and "Fixed Az Scan". "CERES Biaxial Scan" is selected.
- Commands in the Activity:** A list box containing three commands:
  - ATC CEA\_cmd1 START - 00:06
  - ATC CEA\_cmd2 START -00:04 Parm1=P01
  - ATC CEA\_cmd3 START - 00:02 Parm2=7"ATC CEA\_cmd1 START - 00:06" is selected.
- Parameters:** A list box containing "Parm1" and "Parm2". "Parm1" is selected.
- Parameter Values (Enumerated):** A list box containing "HIGH". "HIGH" is selected.

At the bottom of the dialog box are four buttons: OK, APPLY, CANCEL, and HELP.

**Figure B.2.2.3.3-1. BAP Definer Enumerated Parameters Display**

#### **B.2.2.3.3.1 BAP Definer Enumerated Parameters Display Input**

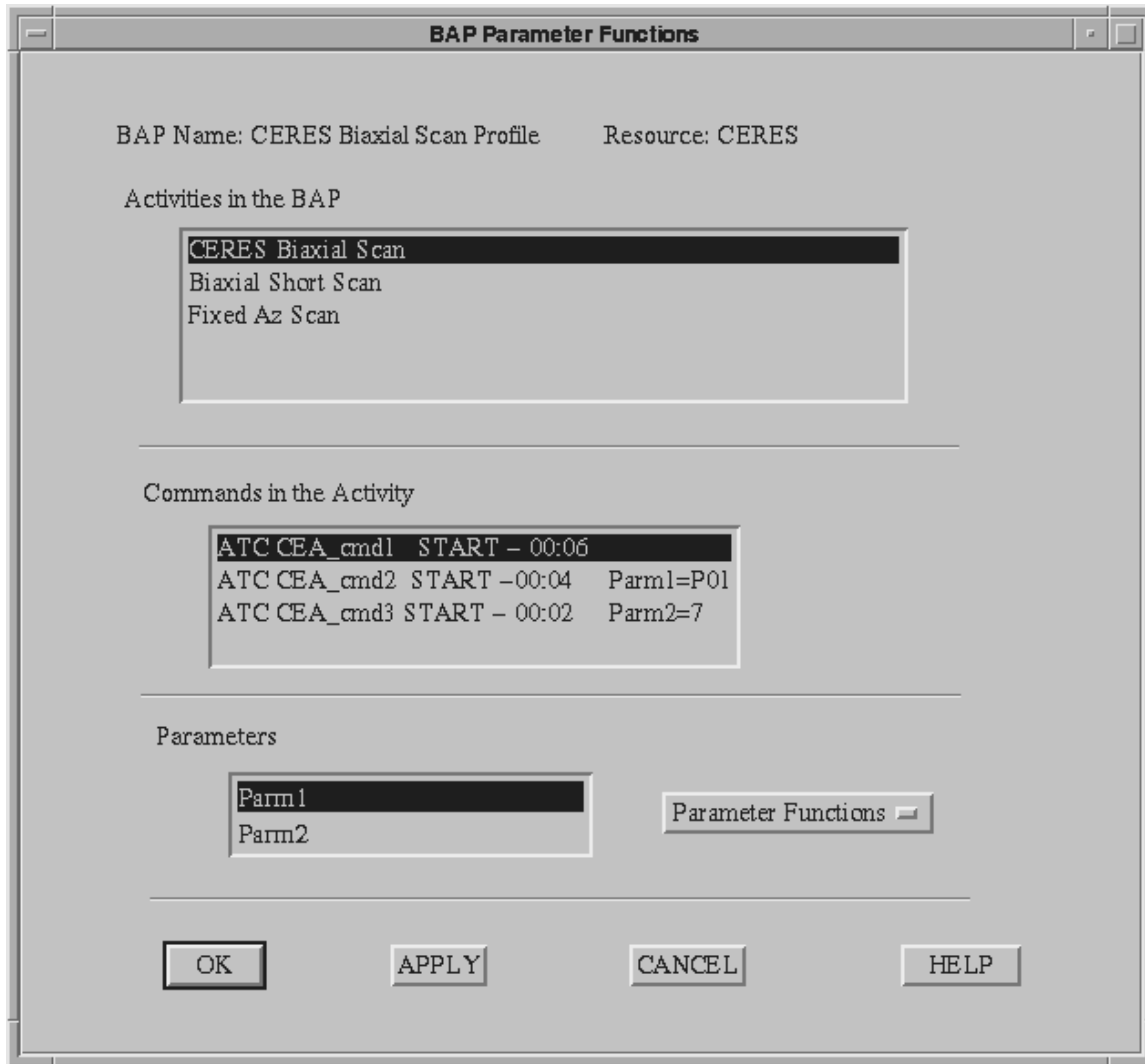
This window is brought up when the user selects the edit parameters from the edit menu on the main window. In this window the user first selects which activity to edit the parameters. Then they choose which command and then which parameter they wish to modify. Depending whether the parameter value is a numeric, an enumerated type, or a function the appropriate parameter widgets to enter the data will appear. In this case it is an enumerated type. The user will then choose the desired value. When the ok button is pressed the window will close and the displayed value will be applied. After the apply button is pressed, the value shown will be applied to that activity. When the cancel button is pressed, the window will close and the changed values shown will not take effect. After the help button is pressed, the user interface help display will show the help information for this window.

#### **B.2.2.3.3.2 BAP Definer Enumerated Parameters Display Output**

When the ok button is pressed the window will close and the displayed value will be applied. After the apply button is pressed, the value shown will be applied to that activity. When the cancel button is pressed, the window will close and the changed values shown will not take effect. After the help button is pressed, the user interface help display will show the help information for this window.



#### B.2.2.3.4 BAP Definer Parameter Functions Display



**Figure B.2.2.3.4-1. BAP Definer Parameter Functions Display**

##### B.2.2.3.4.1 BAP Definer Parameter Functions Display Input

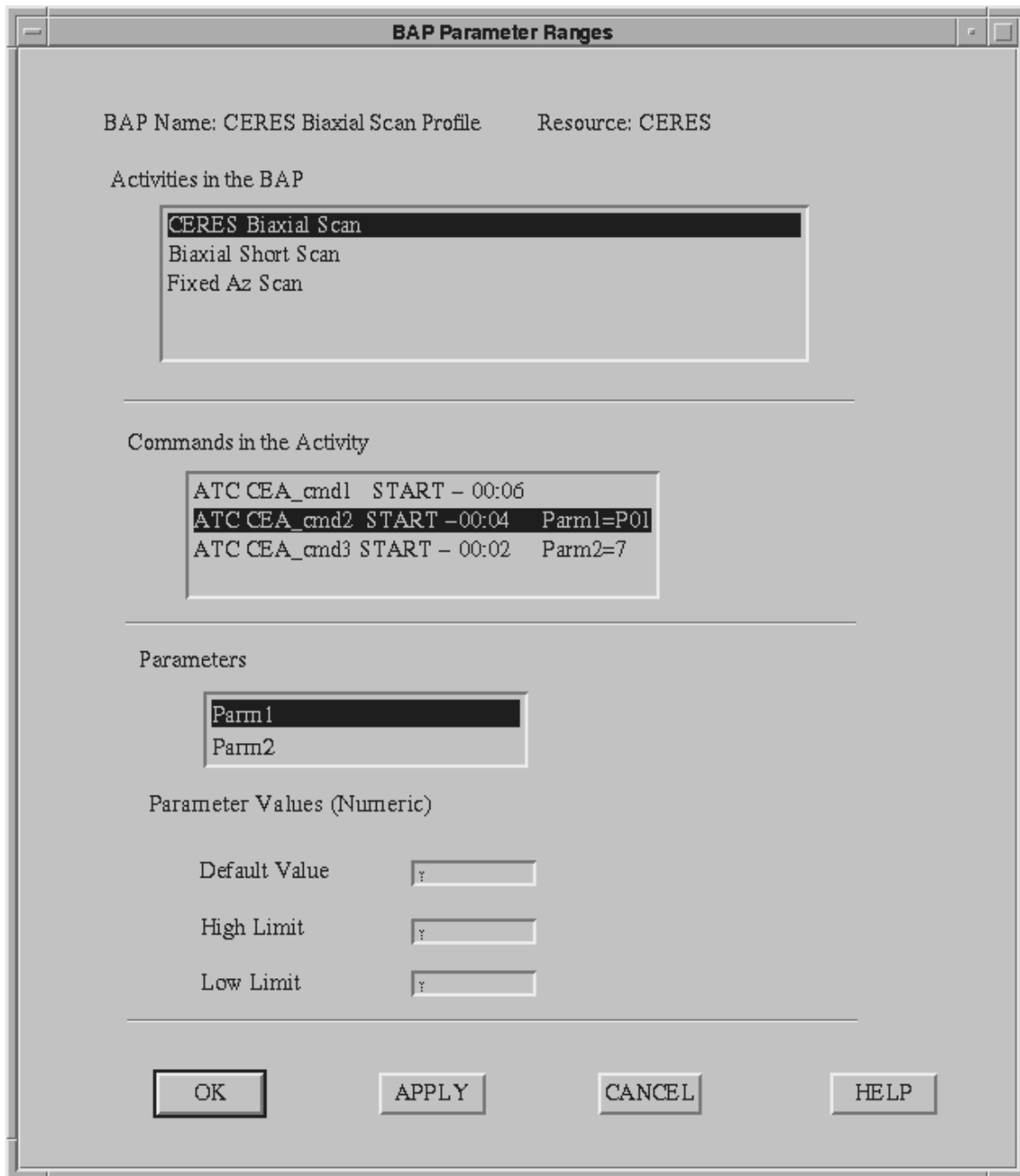
This window is brought up when the user selects the edit parameters from the edit menu on the main window. In this window the user first selects which activity to edit the parameters. Then they choose which command and then which parameter they wish to modify. Depending whether the parameter value is a numeric, an enumerated type, or a function the appropriate parameter widgets to enter the data will appear. In this case it is a function. The user will then choose the desired function. When the ok button is pressed the window will close and the displayed value will be applied. After the apply button is pressed, the value shown will be

applied to that activity. When the cancel button is pressed, the window will close and the changed values shown will not take effect. After the help button is pressed, the user interface help display will show the help information for this window.

#### **B.2.2.3.4.2 BAP Definer Parameter Functions Display Output**

When the ok button is pressed the window will close and the displayed value will be applied. After the apply button is pressed, the value shown will be applied to that activity. When the cancel button is pressed, the window will close and the changed values shown will not take effect. After the help button is pressed, the user interface help display will show the help information for this window.

### B.2.2.3.5 BAP Definer Parameter Ranges Display



The image shows a software dialog box titled "BAP Parameter Ranges". It contains several sections for configuring parameters for a specific BAP (BAP Name: CERES Biaxial Scan Profile, Resource: CERES).

**Activities in the BAP**

- CERES Biaxial Scan (highlighted)
- Biaxial Short Scan
- Fixed Az Scan

**Commands in the Activity**

- ATC CEA\_cmd1 START - 00:06
- ATC CEA\_cmd2 START - 00:04 Parm1=P01 (highlighted)
- ATC CEA\_cmd3 START - 00:02 Parm2=7

**Parameters**

- Parm1 (highlighted)
- Parm2

**Parameter Values (Numeric)**

Parameter	Value
Default Value	?
High Limit	?
Low Limit	?

At the bottom, there are four buttons: OK, APPLY, CANCEL, and HELP.

**Figure B.2.2.3.5-1. BAP Definer Parameter Range Display**

#### **B.2.2.3.5.1 BAP Definer Parameter Ranges Display Input**

This window is brought up when the user selects the edit parameters from the edit menu on the main window. In this window the user first selects which activity to edit the parameters. Then they choose which command and then which parameter they wish to modify. Depending whether the parameter value is a numeric, an enumerated type, or a function the appropriate parameter widgets to enter the data will appear. In this case it is a numeric type. The user will then enter the desired value. When the ok button is pressed the window will close and the displayed value will be applied. After the apply button is pressed, the value shown will be applied to that activity. When the cancel button is pressed, the window will close and the changed values shown will not take effect. After the help button is pressed, the user interface help display will show the help information for this window.

#### **B.2.2.3.5.2 BAP Definer Parameter Ranges Display Output**

When the ok button is pressed the window will close and the displayed value will be applied. After the apply button is pressed, the value shown will be applied to that activity. When the cancel button is pressed, the window will close and the changed values shown will not take effect. After the help button is pressed, the user interface help display will show the help information for this window.

#### B.2.2.3.6 BAP Definer Events Scheduling Information Display

The screenshot shows a window titled "BAP Scheduler Window". At the top, it displays "BAP Name: CERES Biaxial Scan" and "Resource : CERES". Below this, a section titled "Activities in the BAP" contains a list box with three items: "CERES Biaxial Scan" (selected), "Biaxial Short Scan", and "Fixed Az Scan". Underneath the list box, there are two rows of scheduling options. The first row is for "Start Time for Activity based on:" with radio buttons for "Event" (selected) and "Repeat Period". Below this, "Trigger Event Type" is set to "Sunrise" with a dropdown arrow, followed by a "+" radio button, a time input field showing "00:00", and a "mm:ss" dropdown arrow. A "-" radio button is also present. The second row is for "Stop Time for Activity based on:" with radio buttons for "Event" (selected) and "Duration". Below this, "Duration :" is set to "12:00" with a dropdown arrow, followed by a "mm:ss" dropdown arrow. At the bottom of the window are four buttons: "OK", "APPLY", "CANCEL", and "HELP".

**Figure B.2.2.3.6-1. BAP Definer Scheduling Information Display using Events and Duration**

##### B.2.2.3.6.1 BAP Definer Events Scheduling Information Display Input

This window is brought up when the user chooses the scheduling information option from the edit menu on the main window. The user first chooses an activity. Then they choose if the start time of the activity is to be scheduled off of an event or if the activity is to be repeated on a regular interval. In this case the user chooses to enter the start time by an event. Therefore they need to first select an orbital event. Then enter the offset and whether the offset is before or after the event. Once this has been entered the stop time for an activity needs to be entered. The user may choose either event or duration. The event is the same as the start time and the duration is

just the duration of the activity from the start time. When the user presses the ok button the window will close and the scheduling information will be applied for that activity. When the apply button is pressed the shown information is applied. If cancel is selected the window will close and if the help option is selected the user interface will display the help information.

#### **B.2.2.3.6.2 BAP Definer Events Scheduling Information Display Output**

When the user presses the ok button the window will close and the scheduling information will be applied for that activity. When the apply button is pressed the shown information is applied. If cancel is selected the window will close and if the help option is selected the user interface will display the help information.

### B.2.2.3.7 BAP Definer Reference time Scheduling Information Display

The screenshot shows a window titled "BAP Scheduler". At the top, it displays "BAP Name: CERES Biaxial Scan" and "Resource : CERES". Below this is a section titled "Activities in the BAP" containing a list box with three items: "CERES Biaxial Scan" (selected), "Biaxial Short Scan", and "Fixed Az Scan". Underneath the list box, there are two radio buttons: "Event" and "Repeat Period", with "Repeat Period" being selected. Below the radio buttons are two input fields: "Reference Date :" with the value "1999:220" and a time field with the value "12:00:00". Below these is a "Frequency :" label followed by an empty input field and a "mm:ss" spinner. Further down, there are two more radio buttons: "Event" and "Duration", with "Duration" being selected. Below these are two input fields: "Duration :" with the value "12:00" and another "mm:ss" spinner. At the bottom of the window are four buttons: "OK", "APPLY", "CANCEL", and "HELP".

**Figure B.2.2.3.7-1. BAP Definer Scheduling Information Display using Reference Time and Duration**

#### B.2.2.3.7.1 BAP Definer Reference time Scheduling Information Display Input

This window is brought up when the user chooses the scheduling information option from the edit menu on the main window. The user first chooses an activity. Then they choose if the start time of the activity is to be scheduled off of an event or if the activity is to be repeated on a regular interval. In this case the user chooses a repeated interval. Therefore they need to enter a reference date and a frequency. Once this has been entered the stop time for an activity needs to

be entered. The user may choose either by event or duration. The event is the same as the start time and the duration is just the duration of the activity from the start time. When the user presses the ok button the window will close and the scheduling information will be applied for that activity. When the apply button is pressed the shown information is applied. If cancel is selected the window will close and if the help option is selected the user interface will display the help information.

#### **B.2.2.3.7.2 BAP Definer Reference time Scheduling Information Display Output**

When the user presses the ok button the window will close and the scheduling information will be applied for that activity. When the apply button is pressed the shown information is applied. If cancel is selected the window will close and if the help option is selected the user interface will display the help information.

### **B.2.3 Scheduler**

#### **B.2.3.1 Scheduler Usage**

The Scheduler tool is used by the IOT or the EOC FOT to schedule an activity, a BAP, or a single command.

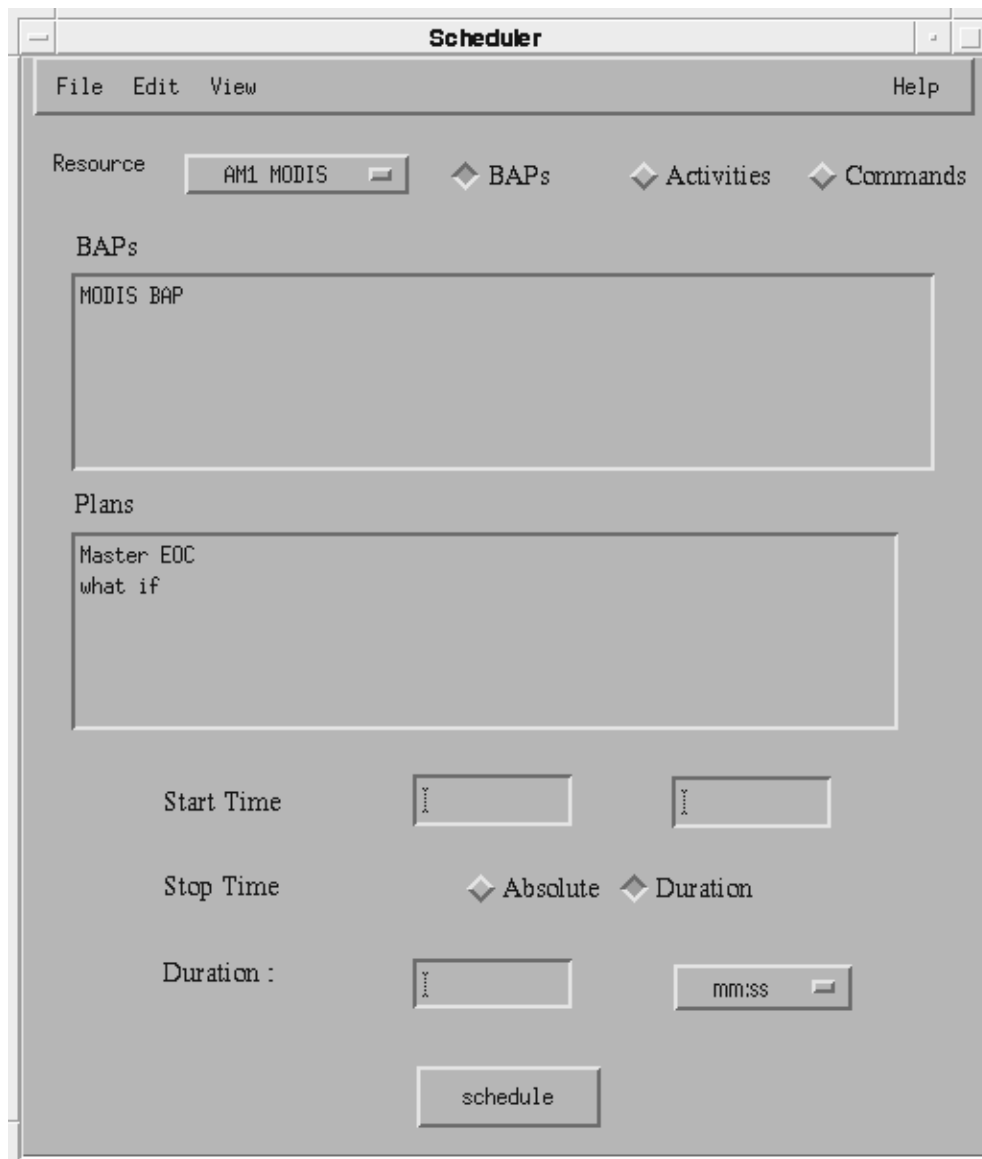
#### **B.2.3.2 Scheduler Access**

The Scheduler tool is brought up when the user selects this tool from the options provided in the "PAS room" provided by FUI. The sample screens for the Scheduler tool are shown in Figures B.2.3.3.1-1 through B.2.3.3.3-1.

#### **B.2.3.3 Scheduler Displays**



### B.2.3.3.1 Scheduler Display for BAP Scheduling



**Figure B.2.3.3.1-1. Scheduler Display : BAP Scheduling**

#### B.2.3.3.1.1 Scheduler Display Input for BAP Scheduling

The Scheduler display for bap scheduling is shown in Figure B.2.3.3.1-1. The file menu provides the user the option of exiting the application. The Edit menu allows the user to modify the activity parameters and since these screens are identical to the activity definer windows the displays are shown there. The view option displays the currently selected bap since the bap

toggle button is pressed. The help menu brings up the user interface help process that will display the help text. To schedule a bap the user will first select a resource and then make sure that the bap toggle button is pressed. Then they will select a bap and a plan. Next an absolute start time is entered. After the start time has been entered the user needs to provide the stop time. This may be given either in an absolute time or by a duration. In this case the duration has been selected. The user enters how long the bap is to be scheduled and then presses the schedule button to schedule the bap.

#### **B.2.3.3.1.2 Scheduler Display Output for BAP Scheduling**

The file menu provides the user the option of exiting the application. The Edit menu allows the user to modify the activity parameters and since these screens are identical to the activity definer windows the displays are shown there. The view option displays the currently selected bap since the bap toggle button is pressed. The help menu brings up the user interface help process that will display the help text. When the user presses the schedule button to schedule a bap, the activities will be scheduled. This can be viewed from the timeline.

### B.2.3.3.2 Scheduler Display for Activity Scheduling

The screenshot shows a window titled "Scheduler" with a menu bar (File, Edit, View, Help). Below the menu bar, there are three radio buttons: "Resource" (selected), "BAPs", "Activities", and "Commands". The "Resource" button is currently selected, and its value "AM1 MODIS" is displayed in a text box. Below this, there are two sections: "Activities" and "Plans". The "Activities" section contains a list box with "Modis Collection" and "Modis Calibration". The "Plans" section contains a list box with "Master EOC" and "what if". Below these sections, there are two sets of controls for scheduling. The first set is for "Schedule Start Time By:" with radio buttons for "Event" (selected) and "Absolute Time". Below "Event" are two diamond-shaped buttons with "+" and "-" signs, a text box for "Event Time", and a "mm:ss" text box. The second set is for "Schedule Stop Time By:" with radio buttons for "Event" (selected), "Absolute Time", and "Duration". Below "Event" are two diamond-shaped buttons with "+" and "-" signs, a text box for "Stop Time", and a "mm:ss" text box. At the bottom center, there is a "schedule" button.

Scheduler

File Edit View Help

Resource  ☐ BAPs ☐ Activities ☐ Commands

Activities

Modis Collection  
Modis Calibration

Plans

Master EOC  
what if

Schedule Start Time By: ☐ Event ☐ Absolute Time

☐ +

☐ -

Event Time

Schedule Stop Time By: ☐ Event ☐ Absolute Time ☐ Duration

☐ +

☐ -

Stop Time

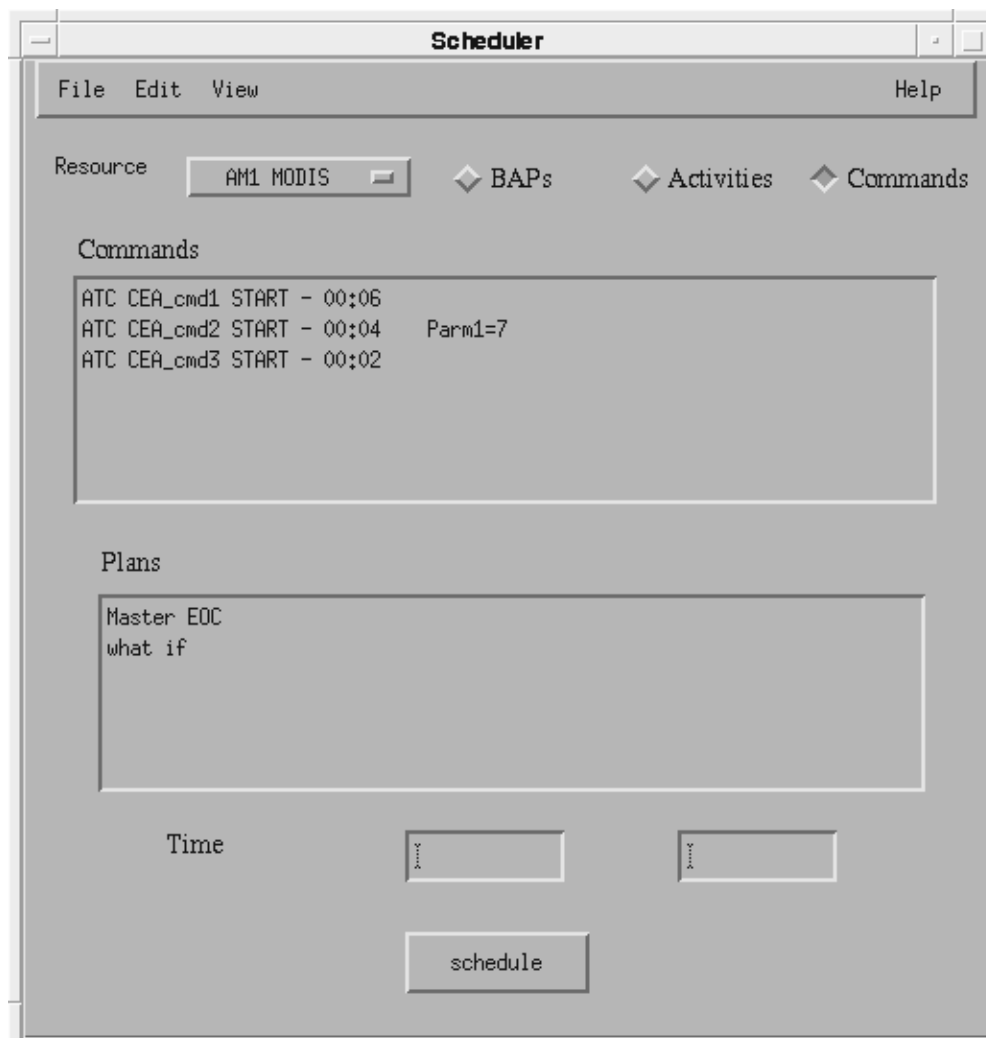
**Figure B.2.3.3.2-1. Scheduler Display : Activity Scheduling**

#### **B.2.3.3.2.1 Scheduler Display Input for Activity Scheduling**

The Scheduler display for activity scheduling is shown in Figure B.2.3.3.2-1. The file menu provides the user the option of exiting the application. The Edit menu allows the user to modify the activity parameters and since these screens are identical to the activity definer windows the displays are shown there. The view option displays the currently selected activity since the activity toggle button is pressed. The help menu brings up the user interface help process that will display the help text. To schedule an activity the user will first select a resource and then make sure that the activity toggle button is pressed. Then they will select an activity and a plan. Next the user specifies how the start time for the activity is determined. Either by an orbital event or by an absolute time. In this example the user chose to schedule the activity by an orbital event by pressing the event toggle button. The user selects which orbital event and enters the offset. Next the time of the event is entered either from the timeline or by the user entering the time. Once this has been accomplished the user needs to provide the stop time. This may be given either by an orbital event, an absolute time, or by a duration. In this case the duration has been selected. The user enters how long the activity is to be scheduled and then presses the schedule button to schedule the activity.

#### **B.2.3.3.2.2 Scheduler Display Output for Activity Scheduling**

The file menu provides the user the option of exiting the application. The Edit menu allows the user to modify the activity parameters and since these screens are identical to the activity definer windows the displays are shown there. The view option displays the currently selected activity since the activity toggle button is pressed. The help menu brings up the user interface help process that will display the help text. When the user presses the schedule button to schedule an activity, the activity will be scheduled. This can be viewed from the timeline.



**Figure B.2.3.3.3-1. Scheduler Display : Command Scheduling**

#### **B.2.3.3.3.1 Scheduler Display Input for Command Scheduling**

The Scheduler display for command scheduling is shown in Figure B.2.3.3.3-1. The file menu provides the user the option of exiting the application. The Edit menu allows the user to modify the command parameters and since these screens are identical to the activity definer windows the displays are shown there. The view option has no functionality when scheduling commands so the view menu option does nothing. The help menu brings up the user interface help process that will display the help text. To schedule a command the user will first select a resource and then make sure that the command toggle button is pressed. Then they will select a command and a plan. Next the user specifies the absolute time of when the command will be scheduled and then presses the schedule button to schedule the command.

#### **B.2.3.3.3.2 Scheduler Display Output for Command Scheduling**

The file menu provides the user the option of exiting the application. The Edit menu allows the user to modify the command parameters and since these screens are identical to the activity definer windows the displays are shown there. The view option has no functionality when scheduling commands so the view menu option does nothing. The help menu brings up the user interface help process that will display the help text. When the user presses the schedule button to schedule a command, the command will be scheduled. This can be viewed from the timeline.

### **B.2.4 Plan Tool**

#### **B.2.4.1 Plan Tool Usage**

The Plan tool is used by the IOT or the EOC FOT to establish accesses, permissions or locks on plans maintained by the PAS system. These include the Master EOC plan or one of the What-if plans defined by the users.

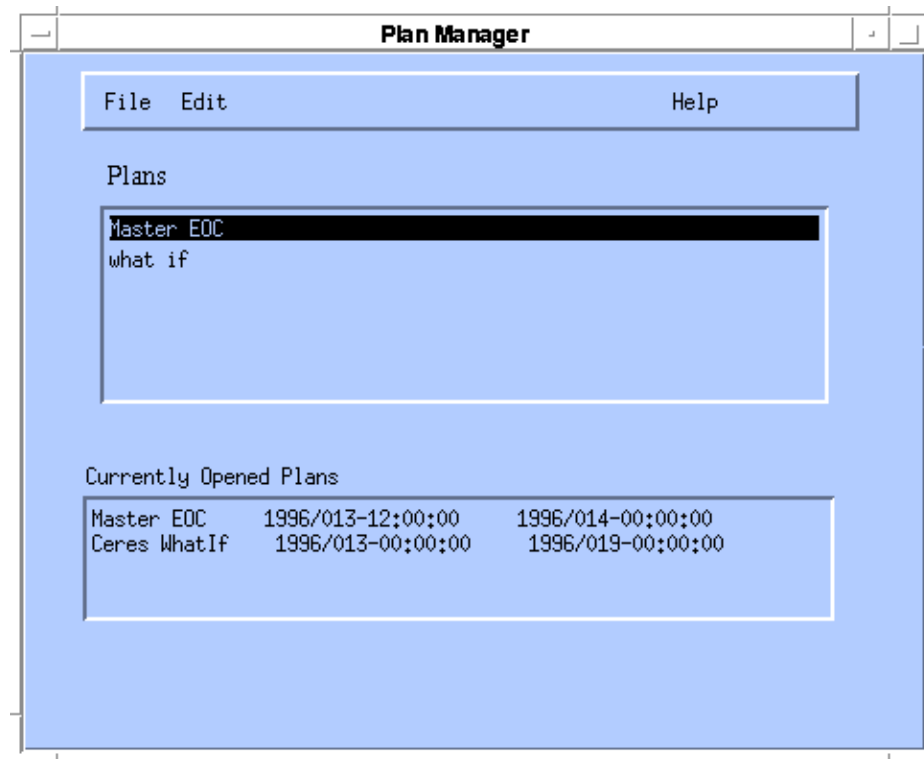
#### **B.2.4.2 Plan Tool Access**

The Plan tool is brought up when the user selects this tool from the options provided in the "PAS room" provided by FUI. The sample screens for the Plan tool are shown in Figures B.2.4.3.1-1 through B.2.4.3.3-1.

#### **B.2.4.3 Plan Tool Displays**

##### **B.2.4.3.1 Plan Tool Top Level Display**

The plan tool allows the user-group to select a plan and set permissions and/or locks on them at the resource level. When one user-group has set an access on a resource for a time period on a given plan, any other user-group may not schedule an activity on it for the same resource during that period. This allows plan integrity, and enforces user coordination on use of plans.



**Figure B.2.4.3.1-1. Plan Tool Top Level Display**

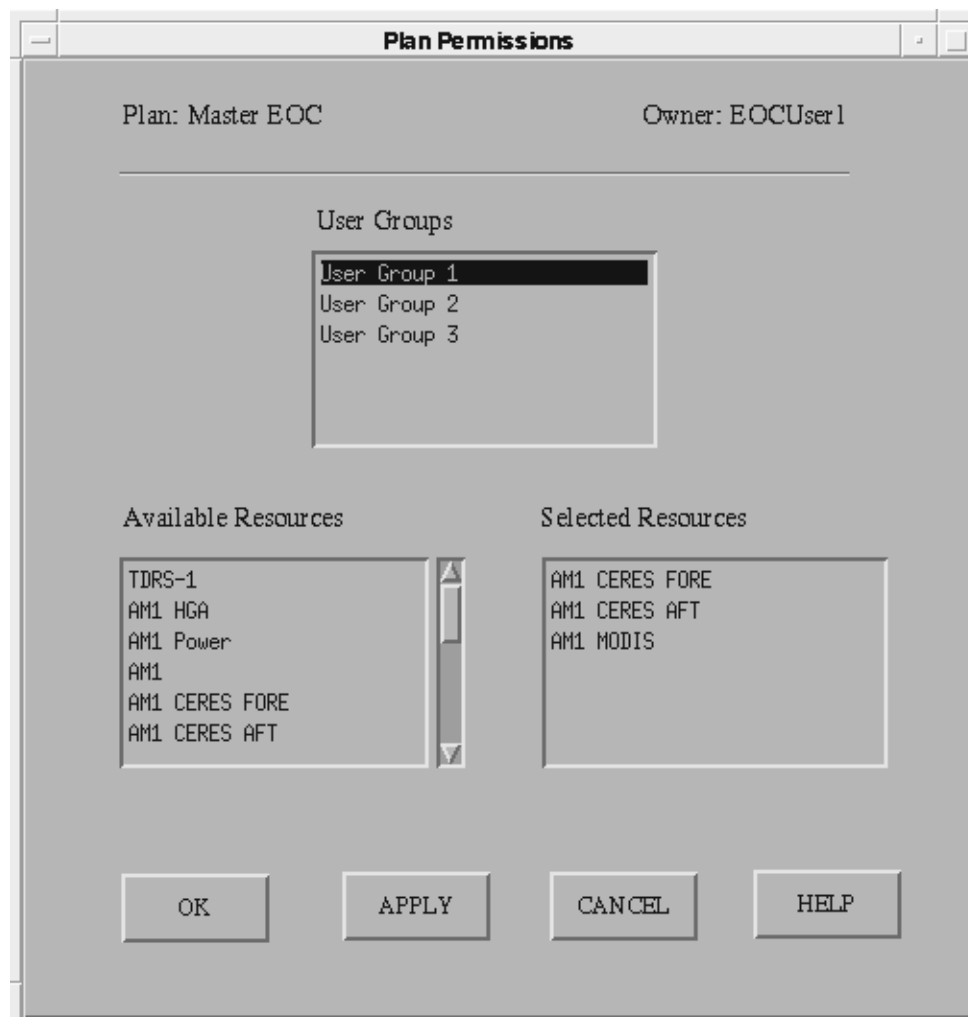
#### **B.2.4.3.1.1 Plan Tool Top Level Display Input**

The "File" pull-down menu on the top level display provides the NEW, OPEN, CLOSE, COPY, SAVE, SAVE AS, DELETE, PRINT and QUIT functions applicable to the maintenance of plans. The "Edit" pull-down menu includes options for setting permissions on plans by resource, setting lock times and changing the time range on plans. The displays for the NEW, OPEN, CLOSE, COPY, SAVE, SAVE AS, DELETE, PRINT options simply allow the user to type in the name of the plan on which to operate, and the OK, CANCEL and HELP buttons.

#### **B.2.4.3.1.2 Plan Tool Top Level Display Output**

The main screen transitions to the appropriate display whenever the user selects an option from one of the pull-down menus. It also provides a summary of the currently opened plans.

#### B.2.4.3.2 Plan Tool Permissions Display



**Figure B.2.4.3.2-1. Plan Tool Permissions Display**

##### B.2.4.3.2.1 Plan Tool Permissions Display Input

The plan permissions screen requires the user to select a group or groups for which they would like to allow permission to update the selected plan. The user also must select the resource or resources on the plan for which permissions will be granted. After the selections are made the user may either confirm the selection and return to the main screen by selecting the "OK" button or may confirm the selection and remain at this screen by selecting "APPLY". If the user decides to cancel the changes they have made, the user selects "CANCEL".



#### B.2.4.3.2.2 Plan Tool Permissions Display Output

The display highlights the user groups that the user has selected. It also shows the selected resources in the "Selected Resources" list.

#### B.2.4.3.3 Plan Tool Locks Display

Locked Resources/Times	
TDRS-1	1999/014-12:00
AM1 HGA	1999/014-12:00
AM1 Power	1999/014-12:00
AM1	1999/014-12:00
AM1 CERES FORE	1999/014-12:00
AM1 CERES AFT	1999/014-12:00
AM1 Low -Rate SSR	1999/014-12:00

Lock Time           

**Figure B.2.4.3.3-1. Plan Tool Locks Display**

##### B.2.4.3.3.1 Plan Tool Locks Display Input

If the user wishes to change a lock time, the user would use this display to enter the appropriate information. The user selects a resource for which they would like to change the lock time and enters the lock time in the "LOCK TIME" field. After the selections are made, the user selects the "OK" button to confirm the changes or selects "CANCEL" to cancel the changes.

##### B.2.4.3.3.2 Plan Tool Locks Display Output

The output of the plan tool locks display screen will highlight any resource chosen and will show the current lock time for each resource.

## **B.2.5 Timeline**

### **B.2.5.1 Timeline Usage**

The Timeline tool is used by the IOT or the EOC FOT to view modeling data contained within the resource model. The data the timeline displays include activities that resources perform through time, constraints related to those activities, FDF planning aid information, subscribable resource utilization information, and system user scheduling write accesses. Besides visualization, the timeline allows performs a number of scheduling functions. The functions include removing activities from a schedule and creating and deleting write accesses for the current user.

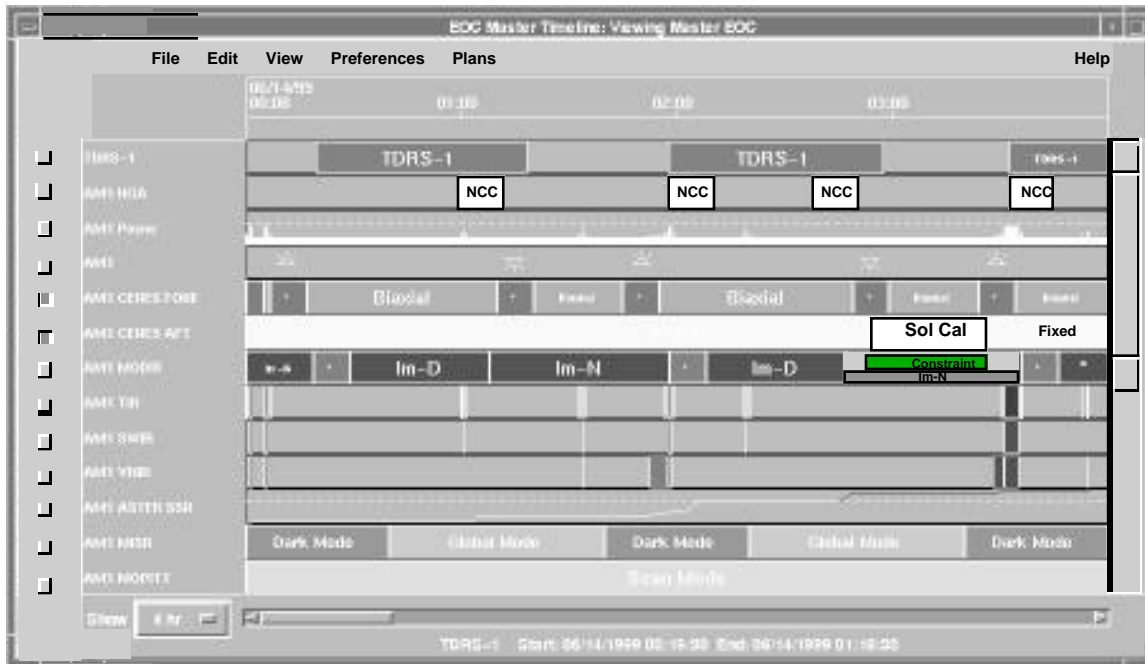
### **B.2.5.2 Timeline Access**

The Timeline tool is brought up when the user selects this tool from the options provided in the "PAS room" provided by FUI. The sample screens for the Timeline tool are shown in the Figures B.2.5.3.1-1 through B.2.5.3.6-1. The following subsections provide the input and output for each of these display screens.

### **B.2.5.3 Timeline Displays**

#### **B.2.5.3.1 Timeline Top Level Display**

The top level screen display shows a variety of information. Each row of the timeline represents information about a resource through time. A user can summary definition of a BAP as it is developed by the user on other displays. The "File" pull down menu on the top level screen provides the OPEN, NEW, SAVE, SAVE AS, DELETE and QUIT functions, as applicable to BAPs. The "Edit" pull down menu allows the user to bring up screen displays where he can specify Activities, Parameters, and Activity scheduling information.



**Figure B.2.5.3.1-1. Timeline Top Level Display**

#### **B.2.5.3.1.1 Timeline Top Level Display Input**

From the top level display of the timeline a user can view one plan at a time. The time span that is viewed can be changed to show more or less time by using the option pop-up menu near the lower-left portion of the screen. The horizontal scroll-bar along the bottom of the screen allows users to scroll through time. The vertical scroll-bar along the right side of the timeline allows users to scroll and zoom in and out of the resources displayed on the timelines main display region in the center of the display. Toggle buttons along the left give users the opportunity to select those resources that the user needs to obtain write access to for scheduling.

The "File" pull-down on the main menu bar provides PRINT and QUIT functions. The "Edit" pull-down offers MODIFY ACTIVITY and REMOVE ACTIVITY. The "View" pull-down provides the user to select between the two different views of activities and accesses. The "Preferences" pull-down allows users to specify desired configurations of the timeline that include COLOR, RESOURCES, FILTER and SAVE CONFIGURATION. The "Plans" pull-down selections vary from session to session depending upon what plans are open and available for display.

#### **B.2.5.3.1.2 Timeline Top Level Display Output**

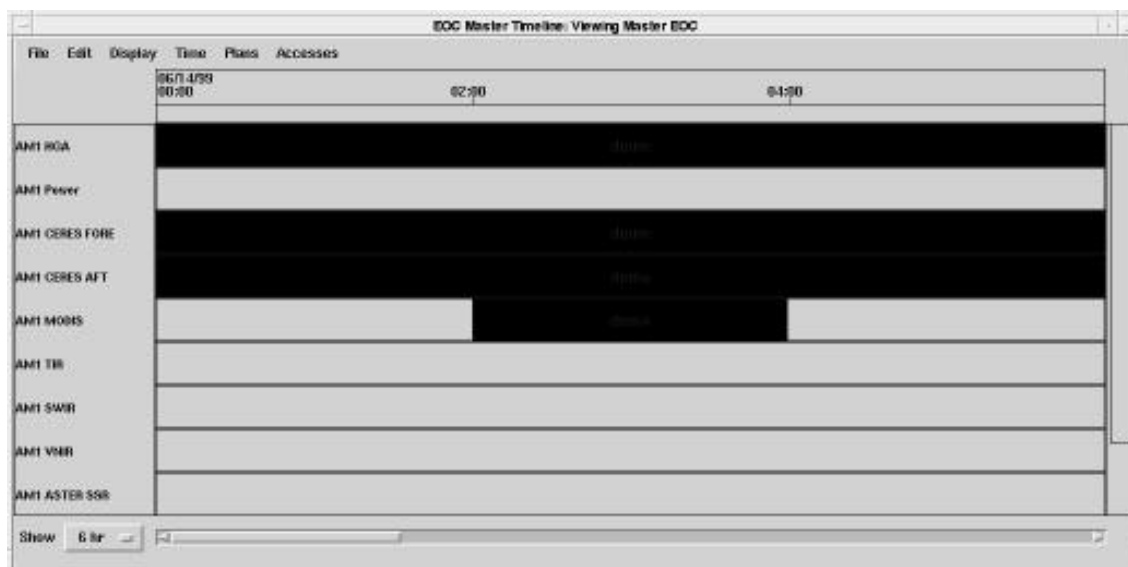
By selecting the option pop-up menu the center display portion of the timeline will change to display the amount of time selected. When users click and drag on the time scroll-bar the display portion will again update to show the time range that the user wished to view. Similarly, a user

may grab the center of the resource scroll-bar to scroll through the resources vertically. The timeline display will update to show the same number of resources but a different variety. By grabbing the ends of the scroll-bar the timeline's main display zooms in and out vertically showing more or fewer resources. The toggle buttons, when pressed update the write accesses that are displayed on the access view of the timeline.

Whenever the user selects an option from one of the five pull-down menus the appropriate action is taken which includes displaying a dialog box or performing some timeline function.

Display screens are brought up for the PRINT, MODIFY ACTIVITY, COLORS, RESOURCES, and FILTER selections. The QUIT option quits the timeline process. The REMOVE ACTIVITY removes the selected activity from the main timeline's display region. Selecting the ACTIVITIES option changes the timeline display to show activities and the ACCESSES shows user write access privileges. SAVE CONFIGURATION saves the display configuration and selecting a plan from the "Plans" pull-down will cause the timeline to update and display that plan.

### **B.2.5.3.2 Timeline Write Accesses Display**



***Figure B.2.5.3.2-1 Timeline Write Accesses Display***

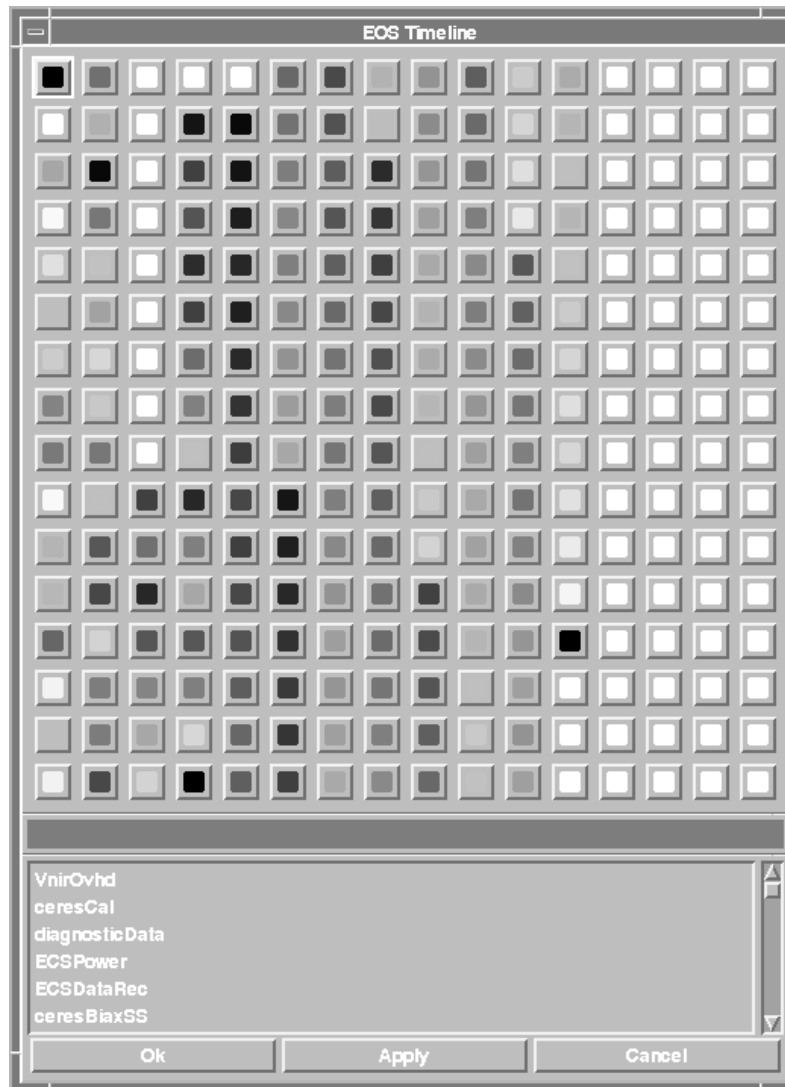
#### **B.2.5.3.2.1 Timeline Write Accesses Display Input**

The access view of the timeline contains the same inputs as the main timeline. See Section B.2.5.3.1.1 for a complete description.

### B.2.5.3.2.2 Timeline Write Accesses Display Output

The access view of the timeline contains the same outputs as the main timeline. See Section B.2.5.3.1.2 for a complete description.

### B.2.5.3.3 Timeline Color Changer Display



**Figure B.2.5.3.3-1. Timeline Color Changer Display**

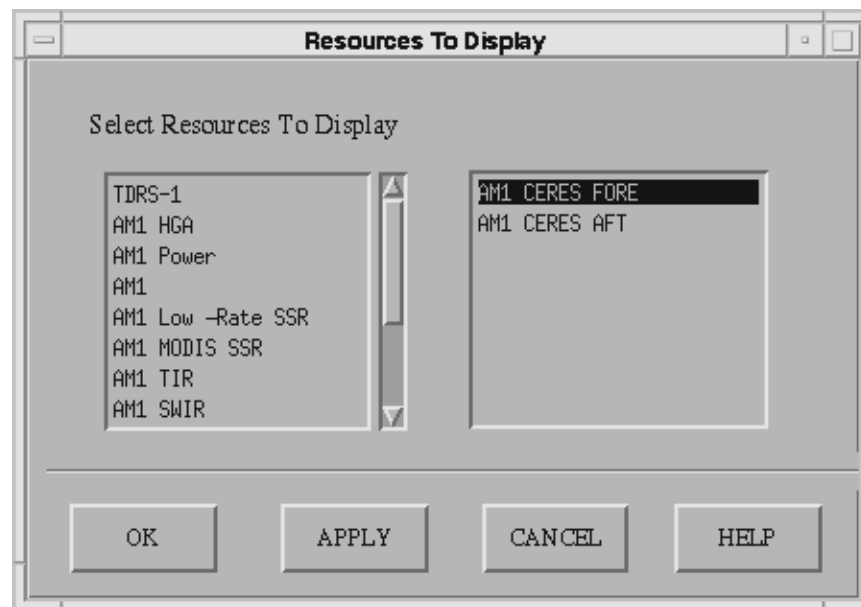
#### **B.2.5.3.3.1 Timeline Color Changer Display Input**

The Timeline Color Changer display contains a palette of colors a user may select from. The display also includes a scrollable list of activity and event types a user may choose from thereby associating a color.

#### **B.2.5.3.3.2 Timeline Color Changer Display Output**

The APPLY button when pressed causes the timeline's main display to update to reflect the color changes that were made using the Color Changer display. The OK button also applies the changes and also closes the panel.

#### **B.2.5.3.4 Timeline Resource Chooser Display**



***Figure B.2.5.3.4-1. Timeline Resource Chooser Display***

#### **B.2.5.3.4.1 Timeline Resource Chooser Display Input**

Select Resources To Display - This dual set of scrolled list widgets contains on the left the total list of available resources for display. The list widget on the right contains those resources the user wishes to display.

#### **B.2.5.3.4.2 Timeline Resource Chooser Display Output**

The APPLY button causes the timeline's main display to update to show those resources the user selected. The OK button also changes the timeline's main display and also closes the panel.

#### **B.2.5.3.5 Timeline Time Range Display**



***Figure B.2.5.3.5-1. Timeline Time Range Display***

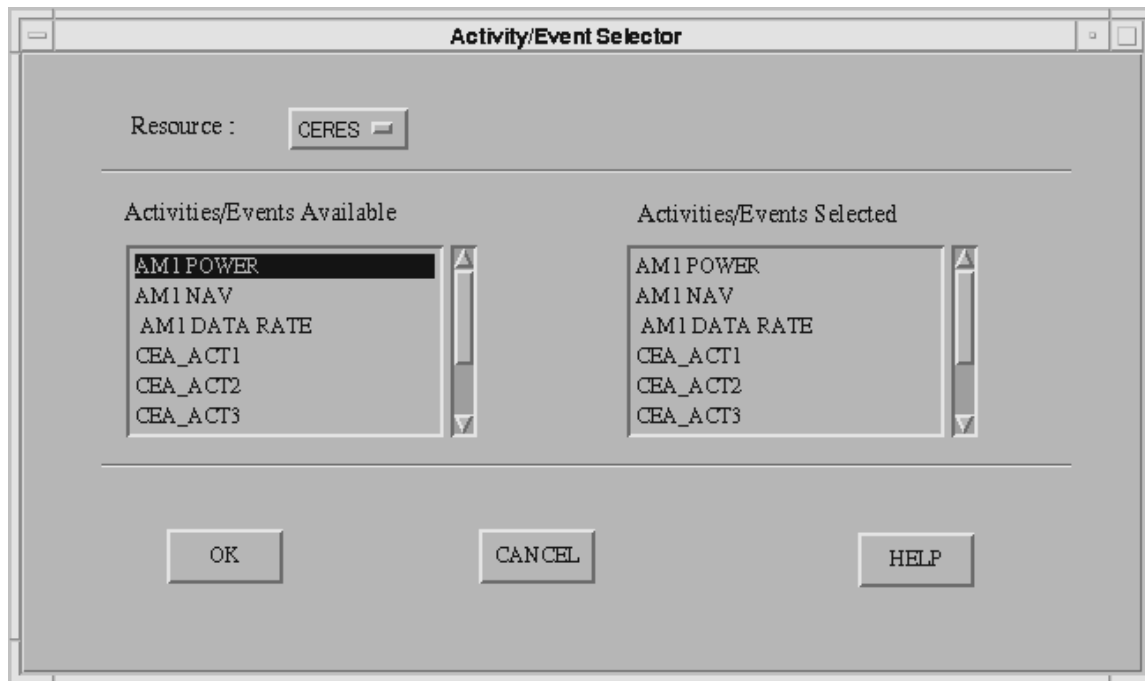
##### **B.2.5.3.5.1 Timeline Time Range Display Input**

The time range panel displays the time range that the current plan displayed on the timeline is open for. Users can modify the start or stop time of the open plan by entering the times into the text field widgets.

##### **B.2.5.3.5.2 Timeline Time Range Display Output**

Pressing on the OK button causes the timeline's main display to update to show that the total time range a user can scroll about in has changed. This action has the same effect as closing this plan using the Plan Tool and re-opening the same plan but for a new time range.

### B.2.5.3.6 Timeline Activity/Event Filter Display



**Figure B.2.5.3.6-1. Timeline Activity/Event Filter Display**

#### B.2.5.3.6.1 Timeline Activity/Event Filter Display Input

The Resource option menu widgets allow the user to select from all resources that a user can filter out activities and events that are displayed on the timeline. The dual scrolled list widget displays all the activities and events associated with the resource on the left and the list of activities and events that a user wishes to display in the right list.

#### B.2.5.3.6.2 Timeline Activity/Event Filter Display Output

The OK button, when pressed, updates the timeline's main display to show those activities and events specified in the Activity/Event Filter display.

### B.2.6 Recycler

#### B.2.6.1 Recycler Usage

The activity recycler serves as a collection point for activities that have been removed from a plan. From this list of activities, the user may select one or more activities to be rescheduled on the plan they were removed from, or to be removed completely from the system. In order to aid



the user in finding the desired activities to reschedule or delete, the activity recycler provides a series of filters that can be set to limit the activities displayed on the primary display.

### **B.2.6.2 Recycler Access**

The activity recycler is brought up when the user selects this tool from the options provided in the "PAS room" provided by FOS User Interface subsystem (FUI). The sample screens for the activity recycler are shown in Figures B.2.6.3.1-1 through B.2.6.3.5-1. The following subsections provide the input and output of each of these display screens.

### **B.2.6.3 Recycler Displays**

#### **B.2.6.3.1 Recycler Top Level Display**

The activity recycler top level display shows a list of activities that have been removed from plans. The activities in the list are determined by the settings of the various filters available to the user.



**Figure B.2.6.3.1-1. Recycler Top Level Display**

#### **B.2.6.3.1.1 Recycler Top Level Display Input**

The "File" pulldown menu provides the EMPTY and QUIT functions. EMPTY will delete all activities currently displayed in the recycler, while QUIT will quit the application. The "Filter" menu has options for TIME, RESOURCE, PLAN, ACTIVITY, ACCESS, ALL, LOAD and SAVE. Time, resource, plan, and activity bring up displays that allow filtering of displayed activities based on the corresponding label. Access toggles filtering by access on and off. All will bring up all of the filtering displays. Load and Save allow the user to load a filter configuration or save the current filter configuration. The "View" menu contains ACTIVITY DETAILS, which will bring up the activity view pop-up for the first of the currently selected activities.

The "Unscheduled Activities" list displays all of the unscheduled activities, based on the filtering information set by the user. The user may select one or more activities from this list.

The DELETE button will delete all of the activities selected by the user. The reschedule button will reschedule all of the activities selected by the user.

#### **B.2.6.3.1.2 Recycler Top Level Display Output**

Selection of options from the menus at the top of the screen will cause any appropriate screens to appear for further selections. The Unscheduled activities list will always show the current unscheduled activities that are appropriate for the selected filtering options.

#### **B.2.6.3.2 Recycler Activity Filter Display**



***Figure B.2.6.3.2-1. Recycler Activity Filter Display***

#### **B.2.6.3.2.1 Recycler Activity Filter Display Input**

Choose Activity Types - This scrollable list allows the user to select activity types.

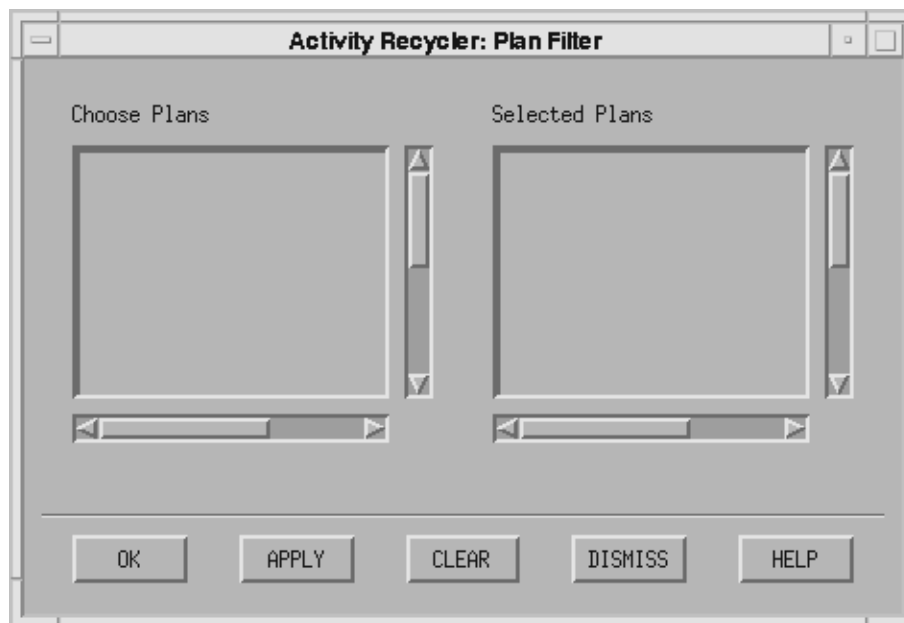
Selected Activity Types - This scrollable list allows the user to select activity types.

The OK button applies the changes the user has made and closes the window. The APPLY button applies the changes, but does not close the window. The CLEAR button removes any changes made since the last ok or apply. The DISMISS button clears any changes and also closes the window.

#### **B.2.6.3.2.2 Recycler Activity Filter Display Output**

When the user selects an activity type from the Choose Activity Types list, the selected activity will be moved to the Selected Activity Types list. Similarly, selection of an activity type from the Selected Activity Types list will move that activity to the Choose Activity Types list. Pressing the OK or APPLY buttons will set the new filtering information, and cause the Top Level display to update its list of unscheduled activities.

#### **B.2.6.3.3 Recycler Plan Filter Display**



***Figure B.2.6.3.3-1. Recycler Plan Filter Display***

#### **B.2.6.3.3.1 Recycler Plan Filter Display Input**

Choose Plans - This scrollable list allows the user to select a plan.

Selected Plans - This scrollable list displays the user-selected plan.

The OK button applies the changes the user has made and closes the window. The APPLY button applies the changes, but does not close the window. The CLEAR button removes any changes made since the last ok or apply. The DISMISS button clears any changes and also closes the window.

#### **B.2.6.3.3.2 Recycler Plan Filter Display Output**

When the user selects a plan from the Choose Plans list, the selected plan will be moved to the Selected Plans list. Choosing a plan from the Selected Plans list will cause that plan to be moved to the Choose Plans list. Pressing the OK or APPLY buttons will set the new filtering information, and cause the Top Level display to update its list of unscheduled activities.

#### **B.2.6.3.4 Recycler Resource Filter Display**



**Figure B.2.6.3.4-1. Recycler Resource Filter Display**

#### **B.2.6.3.4.1 Recycler Resource Filter Display Input**

Choose Resources - This scrollable list allows the user to select a resource.

Selected Resources - This scrollable list allows the user to select a resource.

The OK button applies the changes the user has made and closes the window. The APPLY button applies the changes, but does not close the window. The CLEAR button removes any

changes made since the last ok or apply. The DISMISS button clears any changes and also closes the window.

#### **B.2.6.3.4.2 Recycler Resource Filter Display Output**

When a resource is selected from the Choose Resources list, it will be moved to the Selected Resources list. Choosing a resource from the Selected Resources list will move it to the Choose Resources List. Pressing the OK or APPLY buttons will set the new filtering information, and cause the Top Level display to update its list of unscheduled activities.

#### **B.2.6.3.5 Recycler Time Filter Display**



The screenshot shows a dialog box titled "Activity Recycler: Time Filter". Inside the dialog, the text "Show activities in time interval:" is displayed. Below this text, there are two rows of input fields. The first row is labeled "start" and contains two fields: a date field with "14 JUN 1999" and a time field with "06:00:00". The second row is labeled "end" and contains two fields: a date field with "14 JUN 1999" and a time field with "12:00:00". Below these input fields, there is a line of text: "Activities on boundaries are" followed by two radio buttons. The first radio button is selected and is labeled "included". The second radio button is labeled "not included". At the bottom of the dialog, there are five buttons: "OK", "APPLY", "CLEAR", "DISMISS", and "HELP".

**Figure B.2.6.3.5-1. Recycler Time Filter Display**

##### **B.2.6.3.5.1 Recycler Time Filter Display Input**

Show activities in time interval:

start - allows the user to enter a date and time for the start of a time interval.

end - allows the user to enter a date and time for the end of a time interval.

Activities on boundaries allows the user to select one of included or not included.

The OK button applies the changes the user has made and closes the window. The APPLY button applies the changes, but does not close the window. The CLEAR button removes any changes made since the last ok or apply. The DISMISS button clears any changes and also closes the window.

##### **B.2.6.3.5.2 Recycler Time Filter Display Output**

Pressing the OK or APPLY buttons will set the new filtering information and cause the Top Level display to update its list of unscheduled activities.

## **B.2.7 Load Scheduler**

### **B.2.7.1 Load Scheduler Usage**

The Load Scheduler Tool will provide the capability to schedule the uplink times for the various spacecraft and instrument loads, including instrument microprocessor loads, flight software loads, table loads and RTS loads. The user-specified time period corresponds to an uplink window (e.g. a 6 hour time period) that the FOT/IOTs desire their load to be sent. The Load Scheduler Tool will use this time window to select three valid communication contacts to uplink the specified load, the first being designated the prime contact, while the remaining two are backups. If three valid communication contacts are found, the user will be notified of the chosen communication contacts through their timeline display and status messages. During generation of the ground script, the command procedures for uplinking the load will be inserted into the ground script for execution by the FOT.

### **B.2.7.2 Load Scheduler Access**

The Load Scheduler Tool is launched by the Load Manager Tool provided by the User Interface Subsystem. The Load Manager Tool provides the Load Scheduler Tool with the name of the load the user desires to schedule. The Load Scheduler Tool sends the Load Manager Tool status information pertaining to the scheduling of the load. The following subsections provide information pertaining to each of the tool displays.

### **B.2.7.3 Load Scheduler Displays**

#### **B.2.7.3.1 Load Scheduler Top Level Display**

The Load Scheduler top level display is shown in Figure B.2.7.3.1-1. General information pertaining to the load is displayed in the upper portion of the window. Using this display, a user can schedule an uplink time associated with the load.

**Load Scheduler**

File View Help

**Load Name: MPR\_AM1\_MISR\_99Jun07\_99Jun23**

Resource: AM1 Load Load Type: Microprocessor

Activity: MISR Uplink Act Destination: MISR

Nominal Uplink Time: 1.2 sec Size: 20 kbit

Valid Uplink Period: 1999 Jun 07 12:00:00 - 1999 Jun 23 12:00:00

Plans

Master EOC  
what if

Uplink Window Start: ☒ Orbital Event ☐ Absolute Time

☒ +   ☒ -

Event Time

Uplink Window End: ☐ Orbital Event ☐ Absolute Time ☐ Duration

Stop Time

**Figure B.2.7.3.1-1. Load Scheduler Top Level Display**

### **B.2.7.3.1.1 Load Scheduler Top Level Display Input**

The Load Scheduler top level display contains three pull down menus as described in table B.2.7.3.1.1-1. The user selects the plan they desire the activity to be scheduled on from the labeled list "Plans". The uplink window start time can be entered as an orbital event or an absolute time. If the user selects the "Orbital Event" radio button, they can select the desired event on their timeline display with the mouse, automatically sending the event information to the Load Scheduler tool. The "+" and "-" radio buttons allow a user to select a positive or negative delta time from the event. The delta time is entered in the text field next to the "+" and "-" radio buttons, with the time format determined by the pull-down menu. The user can enter an absolute time for the uplink window start by selecting the "Absolute Time" radio button. Entering the uplink window end time is identical to entering the uplink window start time, with the addition of allowing a user to enter a duration by choosing the "Duration" radio button. Once

the scheduling information is entered on the display, the user presses the "schedule" button for constraint checking and integration into the mission plan.

***Table B.2.7.3.1.1-1. Load Scheduler Menu Options***

<b>Menu Name</b>	<b>Menu Options</b>	<b>Description</b>
File	Quit	Causes the Load Scheduler to quit.
View	Activity	Creates the Activity View pop-up window for viewing an activity definition.
Help		Provides the user with help information pertaining to the Load Scheduler Tool

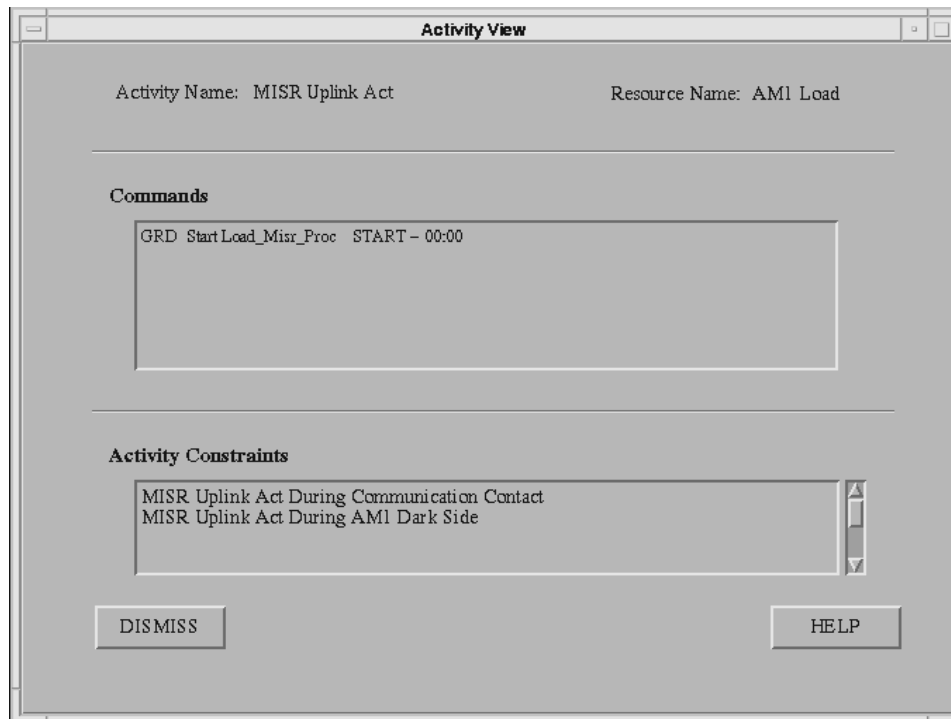
#### **B.2.7.3.1.2 Load Scheduler Top Level Display Output**

If three valid communication contacts are found, the user will be notified of the chosen communication contacts through their timeline display and event handler. Similarly, if constraints are found (e.g. no TDRSS contacts available), the user is notified by constraint messages in their event handler.

#### **B.2.7.3.2 Load Scheduler Activity View Display**

The Load Scheduler Activity View display is shown in Figure B.2.7.3.2-1. General information pertaining to the uplink activity database definition is shown by this window in a read-only fashion.





**Figure B.2.7.3.2. Load Scheduler Activity View Display**

#### **B.2.7.3.2.1 Load Scheduler Activity View Input**

The list of "Commands" and "Activity Constraints" displayed by the Load Scheduler Activity View window are pulled from the configuration controlled project database. All information is non-modifiable and shown to the user for informational purposes only.

#### **B.2.7.3.2.2 Load Scheduler Activity View Output**

The list of "Commands" and "Activity Constraints" displayed by the Load Scheduler Activity View window are pulled from the configuration controlled project database. All information is non-modifiable and shown to the user for informational purposes only.

## **B.2.8 ATC Load Generator**

### **B.2.8.1 ATC Load Generator Usage**

The ATC Load Generator tool will provide the capability to generate an ATC load for a user specified time duration. During load generation, the activities within the user specified portion are frozen to allow no further schedule changes by the IOTs and FOT, resulting in the Detailed Activity Schedule. Activity-level constraints are checked within the DAS to verify no hard constraints exist. A load will not be generated if hard constraints are found, relying on the FOT to manually resolve the conflicts. If soft constraints are found, the user is notified and given the option to accept or reject the DAS. Once created, the DAS is submitted to CMS for command-level constraint checking and generation of the associated ATC load.

During any phase of schedule development, the ATC Load Generator tool can be run in an analysis mode, allowing activity and command-level constraints to be checked without generation of a DAS and ATC load. In addition, simulation loads can be generated to support mission tests that involve the spacecraft simulator.

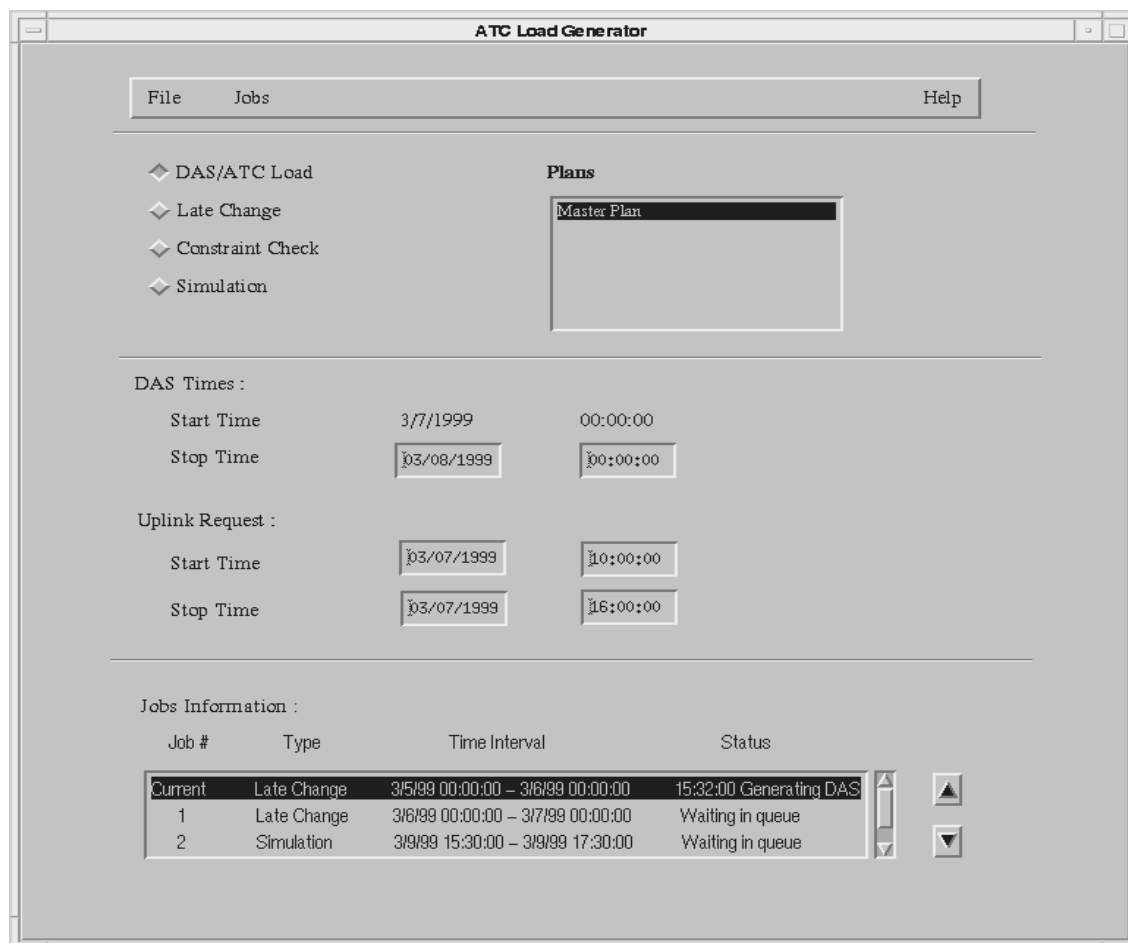
### **B.2.8.2 ATC Load Generator Access**

The ATC Load Generator tool is brought up when the user selects this tool from the options within the "PAS room" provided by the FOS User Interface Subsystem. The following subsections provide information pertaining to each of the tool displays.

### **B.2.8.3 ATC Load Generator Displays**

#### **B.2.8.3.1 ATC Load Generator "DAS/ATC Load" Display**

The ATC Load Generator "DAS/ATC Load" display is shown in Figure B.2.8.3.1-1. This display is shown when the user selects the create "DAS/ATC Load" radio button at the top of the display. With this window, a user can generate an ATC load for a specified portion of the mission schedule.



**Figure B.2.8.3.1-1 ATC Load Generator "DAS/ATC Load" Display**

#### **B.2.8.3.1.1 ATC Load Generator "DAS/ATC Load" Display Input**

The ATC Load Generator display contains three pull down menus as described in table B.2.8.3.1.1-1. The "Plans" labeled list will only show the EOC Master Plan as being available for ATC load generation.

The "DAS Times" pertains to the time interval over which the Detailed Activity Schedule and associated ATC loads will be generated. The DAS "Start Time" is read-only because it is based on the stop time of the previously generated DAS and ATC Load, enforcing continuity of the generated loads. The DAS "Stop Time" is a text field in which the user can enter the stop time of the ATC load.

The "Uplink Request" indicates the time period over which the user would prefer the FOT to uplink the generated ATC load. The "Start Time" and "Stop Time" text fields are used for entering the uplink window times.

The "Jobs Information" labeled list shows the status of the ATC Load Generator processing jobs. Users can move pending jobs up and down in the queue with the arrow buttons on the right. In addition, a user can select a job and choose "Cancel" from the "Jobs" pull down menu to remove it from the queue.

**Table B.2.8.3.1.1-1. ATC Load Generator Menu Options**

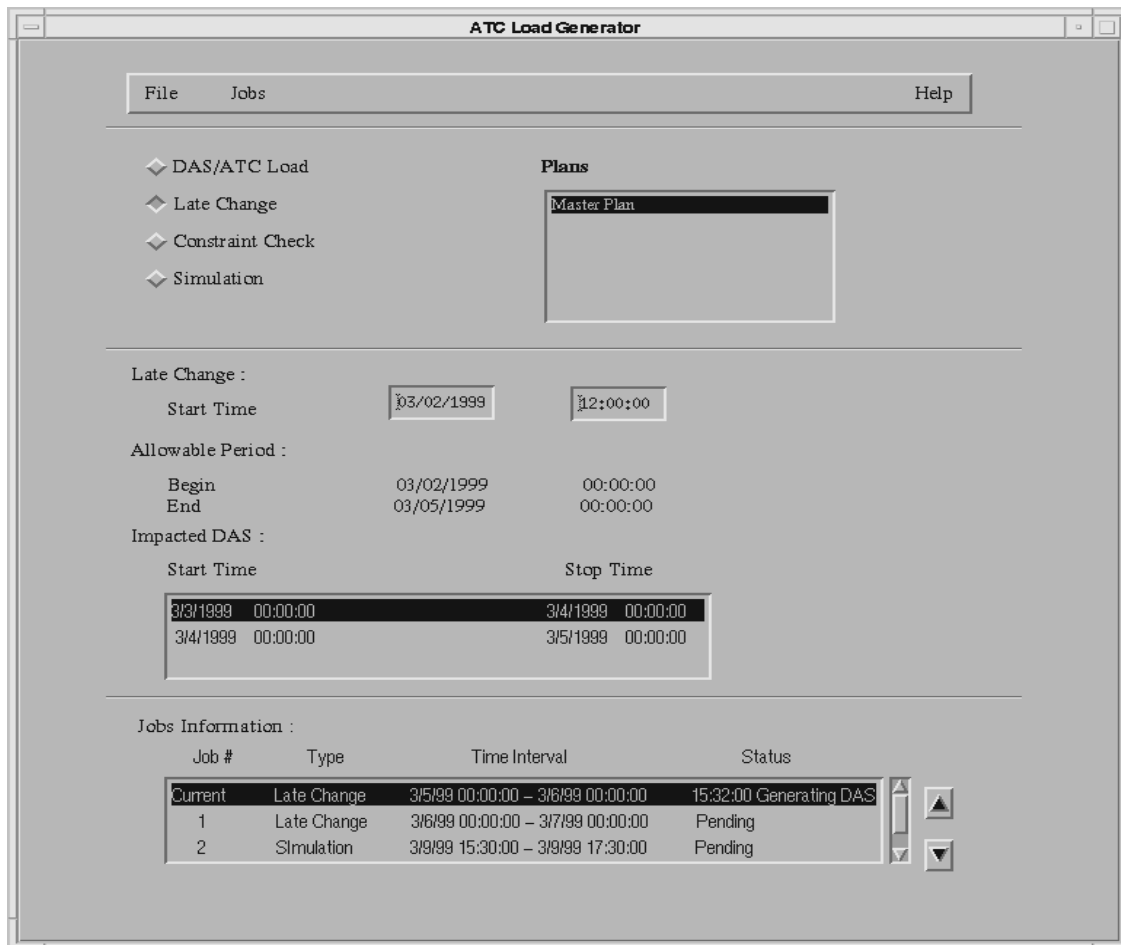
Menu Name	Menu Options	Description
File	Quit	Causes the Load Generator to quit.
	Generate	Processes the requested based on user specified information
	Delete	Brings up dialog box that allows the user to delete a DAS and its associated ATC loads.
Jobs	Cancel	Cancels a job from the queue
	Constraints	Brings up a dialog box that allows the user to approve or disapprove soft constraints
	Show Status	shows status of jobs
Help		Provides the user with help information pertaining to the Load Generator Tool

#### **B.2.8.3.1.2 ATC Load Generator "DAS/ATC Load" Display Output**

As a load is being generated, the processing status is displayed in the "Jobs Information" portion of the ATC Load Generator window. The output product is a generated ATC Load that is available for uplink by the FOT.

#### **B.2.8.3.2 ATC Load Generator "Late Change" Display**

The ATC Load Generator "Late Change" display is shown in Figure B.2.8.3.2-1. This display is shown when the user selects the create "Late Change" radio button at the top of the display. With this window, a user can generate an ATC load in response to a late change in the mission schedule.



**Figure B.2.8.3.2-1. ATC Load Generator "Late Change" Display**

#### **B.2.8.3.2.1 ATC Load Generator "Late Change" Display Input**

The ATC Load Generator display contains three pull down menus as described in table B.2.8.3.1.1-1. The "Plans" labeled list will only show the EOC Master Plan as being available for a late change ATC load generation.

The Late Changes "Start Time" is a text field entered by a user to indicate the time in which the late change begins in the mission schedule. All impacted loads will be regenerated to incorporate the modified mission schedule. The Detailed Activity Schedules that are impacted by the user entered Late Change "Start Time" are displayed in the read-only labeled list "Impacted DAS". To aid the user in choosing the Late Change "Start Time", an "Allowable Period" is shown that indicates the time period over which a late change is acceptable.

The "Jobs Information" labeled list shows the status of the ATC Load Generator processing jobs. Users can move pending jobs up and down in the queue with the arrow buttons on the right. In

addition, a user can select a job and choose "Cancel" from the "Jobs" pull down menu to remove it from the queue.

#### B.2.8.3.2.2 ATC Load Generator "Late Change" Display Output

As a load is being generated, the processing status is displayed in the "Jobs Information" portion of the ATC Load Generator window. The output product is one or more regenerated ATC Loads that are available for uplink by the FOT.

#### B.2.8.3.3 ATC Load Generator "Constraint Check" Display

The ATC Load Generator "Constraint Check" display is shown in Figure B.2.8.3.3-1. This display is shown when the user selects the create "Constraint Check" radio button at the top of the display. With this window, a user can run the ATC Load Generator in an analysis mode, allowing activity and command-level constraints to be checked without generation of a DAS and ATC load.

Job #	Type	Time Interval	Status
Current	Late Change	3/5/99 00:00:00 - 3/6/99 00:00:00	15:32:00 Generating
1	Late Change	3/6/99 00:00:00 - 3/7/99 00:00:00	Pending
2	Simulation	3/8/99 15:30:00 - 3/8/99 17:30:00	Pending

**Figure B.2.8.3.3-1. ATC Load Generator "Constraint Check" Display**

#### **B.2.8.3.3.1 ATC Load Generator "Constraint Check" Display Input**

The ATC Load Generator display contains three pull down menus as described in table B.2.8.3.1.1-1. The "Plans" labeled list will show the EOC Master Plan and any user created "what if" plans as being available for constraint checking. The user selects the plan they are interested in from this list labeled list.

The "Constraint Check Times" pertains to the time interval over which the constraint checking will be performed. The "Start Time" and "Stop Time" text fields are used for entering the time values. The "Processing Function" buttons allows a user to select the types of constraint checking to be performed, including activity-level and command-level checks.

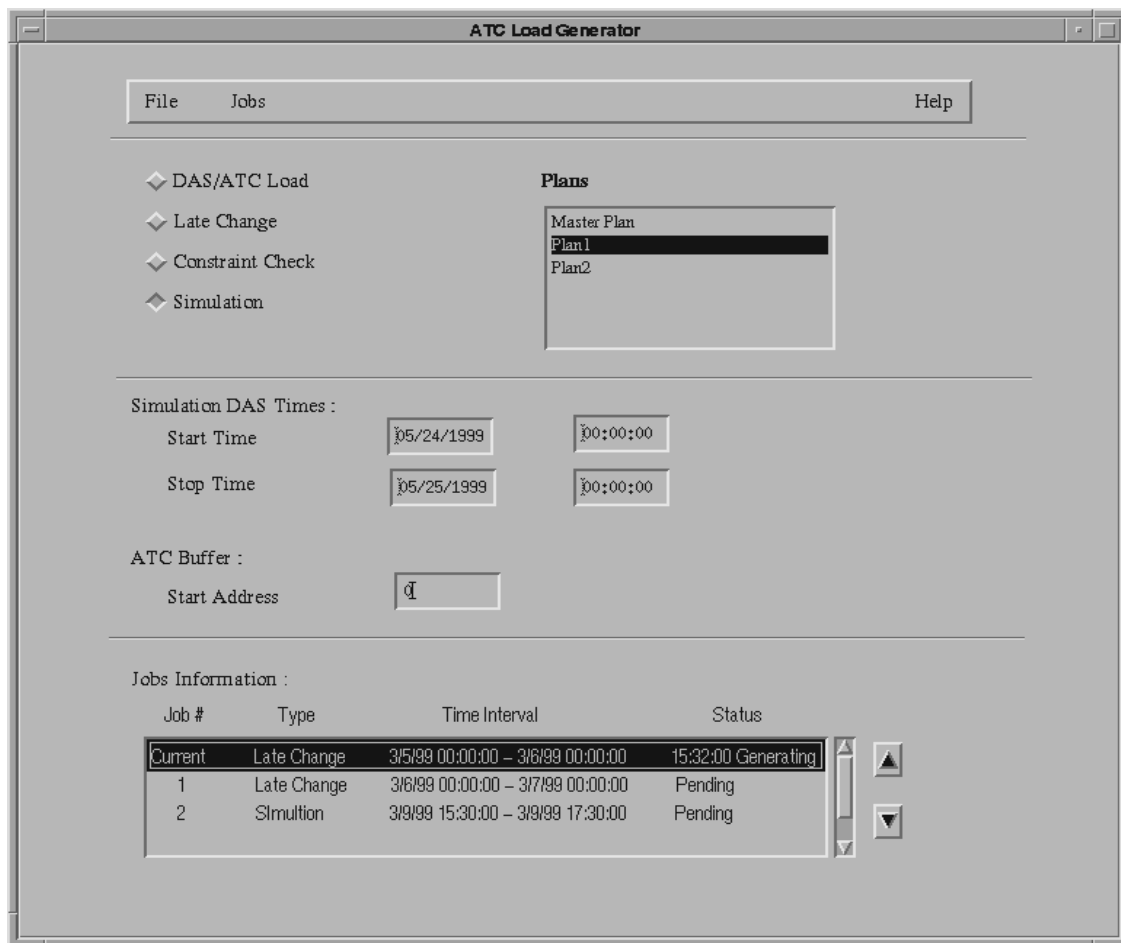
The "Jobs Information" labeled list shows the status of the ATC Load Generator processing jobs. Users can move pending jobs up and down in the queue with the arrow buttons on the right. In addition, a user can select a job and choose "Cancel" from the "Jobs" pull down menu to remove it from the queue.

#### **B.2.8.3.3.2 ATC Load Generator "Constraint Check" Display Output**

As a load is being constraint checked, the processing status is displayed in the "Jobs Information" portion of the ATC Load Generator window. Once complete, a constraint report will be generated for browsing by the user.

#### **B.2.8.3.4 ATC Load Generator "Simulation" Display**

The ATC Load Generator "Simulation" display is shown in Figure B.2.8.3.4-1. This display is shown when the user selects the create "Simulation" radio button at the top of the display. With this window, a user can run the ATC Load Generator in an analysis mode, allowing a simulation ATC load to be generated for supporting mission tests that involve the spacecraft simulator.



**Figure B.2.8.3.4-1. ATC Load Generator "Simulation" Display**

#### **B.2.8.3.4.1 ATC Load Generator "Simulation" Display Input**

The ATC Load Generator display contains three pull down menus as described in table B.2.8.3.1.1-1. The "Plans" labeled list will show the EOC Master Plan and any user created "what if" plans as being available for generating a simulation ATC load. The user selects the plan they are interested in from this list labeled list.

The "Simulation DAS Times" pertains to the portion of the plan over which a simulated ATC load will be generated. The "Start Time" and "Stop Time" text fields are used for entering the time values. The ATC Buffer "Start Address" text field allows a user to enter a starting memory address for simulation purposes.

The "Jobs Information" labeled list shows the status of the ATC Load Generator processing jobs. Users can move pending jobs up and down in the queue with the arrow buttons on the right. In



addition, a user can select a job and choose "Cancel" from the "Jobs" pull down menu to remove it from the queue.

#### **B.2.8.3.4.2 ATC Load Generator "Simulation" Display Output**

As a simulation load is being generated, the processing status is displayed in the "Jobs Information" portion of the ATC Load Generator window. The output product is a generated simulation ATC Load that is available for supporting mission tests that involve the spacecraft simulator.

### **B.2.9 Communication Contact Scheduler**

#### **B.2.9.1 Communication Contact Scheduler Usage**

The FOT uses the Communication Contact Scheduler tool to schedule uplinks and downlinks and to define prototype ids uniquely identify that specify the sequences of configuration codes necessary to perform such contacts.

#### **B.2.9.2 Communication Contact Scheduler Access**

To activate the Communication Contact Scheduler, the user selects it from the "PAS Room" provided by FUI. The sample screens are shown in Figures B.2.9.3.1-1 and B.2.9.3.1-2. Descriptions of the inputs and outputs for these displays follows.

#### **B.2.9.3 Communication Contact Scheduler Displays**

##### **B.2.9.3.1 Communication Contact Scheduler Main Display**

This main display shows a list of defined prototype IDs with their associated descriptions, plans and allows the user to schedule an event based on start time, stop time, TDRS Id, and start time tolerances.

File SAR

Resource ID HGA Batch SAR

Prototype IDs

A01	MA Forward Service	NCC
A02	SSA Forward Service	NCC
A03	KSA Forward Service 2	User
B01	MA Return Service	NCC
B02	SSA Return Service	NCC
B03	KSA Return Service	NCC

Plans

Master Plan  
What-if\_1  
What-if\_2

Event Start Time 1999/12/31 12:00:00

Event Stop Time 1999/12/31 12:11:00

Start Time Tolerance (Plus) 00:03 mm:ss

Start Time Tolerance (minus) 00:01 mm:ss

TDRS Id TDRS-E

Support Flag Normal Premium

OK SCHEDULE CANCEL HELP

**Figure B.2.9.3.1-1. Communication Contact Scheduler Main Display**

#### **B.2.9.3.1.2 Communication Contact Scheduler Main Display Input**

The FILE pull-down menu includes the choices QUIT and TRANSMIT. The NEW and EDIT options comprise the SAR pull-down menu. The user selects from a list of available prototype IDs, including both user-defined and NCC-defined prototype IDs. For a list of possible NCC-defined prototype IDs, refer to "Data Format Control Document Between the Network and Payload Operations Control Centers, Revision 1, December 1994" (hereafter referred to as "DFCD"). The user specifies whether the resource ID is HGA, OMNI, or DAS, and whether he prefers batch or SAR scheduling. The user also specifies on which plan he is scheduling and whether the TDRS used will be west (TDRS-W), east (TDRS-E), or spare (TDRS-S). Additionally, he specifies event start and stop times, start time tolerances, and whether the contact takes normal or premium support.

At the bottom of the screen the user may select from the OK, SCHEDULE, CANCEL, and HELP buttons.

#### **B.2.9.3.1.2 Communication Contact Scheduler Main Display Output**

In response to the user choice of QUIT from the FILE pull-down, the Communication Contact Scheduler shuts down. If instead the user selects TRANSMIT, then the prototype IDs and their associated configuration code sequences are sent to NCC via UPS. Selecting either NEW or EDIT from the SAR pull-down menu brings up Config Codes Display, covered in following section, which allows the user to compose a sequence of configuration codes. When EDIT is selected, the currently selected prototype ID's information is brought up; this option is provided only for user-defined, not NCC-defined, Prototype IDs.

Pressing the OK button effects all changes made and shuts down the tool. Pressing SCHEDULE adds the current contact to the selected plan. CANCEL shuts down the tool and dismisses all changes made. Finally, HELP brings up on-line tool information for the user to peruse.

#### **B.2.9.3.2 Communication Contact Scheduler Configuration Codes Display**

The Configuration Codes displays, for one Prototype ID, a sequence of configuration codes. It allows the user to define, or change a prototype id by specifying the service start delta, duration, and parameter/value pairs.

Save

Prototype Id

Available Config Codes

A01

MA Forward

A02

MA Return

A03

SSA Forward

B01

SSA Return

B02

KSA Forward

B03

KSA Return

Selected Config Codes

A01

02:01

07:30

DTR1=123

B01

03:00

10:00

Service Start Delta

03:50

mm:ss

Service Duration

05:20

mm:ss

Configuration Parameters

DTR1

Value

123

OK

ADD

DELETE

CANCEL

HELP

**Figure B.2.9.3.2-1. Communication Contact Scheduler Configuration Codes Display**

#### **B.2.9.3.2.2 Communication Contact Scheduler Display Configuration Codes Input**

The user builds a sequence of codes from the "Available Configuration Codes" list. (For the contents of this list refer to the DFCD.) For a given selected Configuration Code, the user specifies the service start delta, duration, and configuration parameter/value pairs. The configuration parameters and possible values vary across configuration codes, as specified in the DFCD. The user chooses from a group of buttons at the bottom of the display labeled OK, ADD, DELETE, CANCEL, and HELP.

#### **B.2.9.3.2.2 Communication Contact Scheduler Config codes Display Output**

The sequence of configuration codes is displayed, with the information for each, in the "Selected Config Codes" are B. Pressing OK effects all changes made, reflects these changes on the main window ("Display 1"), and dismisses the secondary window ("Display 2"). Pressing ADD results in adding the current configuration code with its user-specified start delta, duration, and parameters to the "Selected Config Codes" list, hence adding the configuration code to the current sequence. DELETE removes a configuration code from the current sequence. CANCEL dismisses the window without effecting any changes made by the user. HELP brings up on-line help for the user to read.